RA. 6367

SPECTRUM DISPLAY UNIT

INSTRUCTION MANUAL

RACAL COMMUNICATIONS, INC.
8440 SECOND AVENUE
SILVER SPRING, MARYLAND

MAY 1967

RA.6367

SPECTRUM DISPLAY UNIT

CONTENTS

CHAPTER

1. GENERAL DESCRIPTION
2. INSTALLATION
3. OPERATION
4. BRIEF TECHNICAL DESCRIPTION
5. DETAIL CIRCUIT DESCRIPTION
6. REPRESENTATIVE TEST DATA
7. FAULT DIAGNOSIS
8. ALIGNMENT PROCEDURE
9. PARTS LISTS AND SCHEMATIC DIAGRAMS

CHAPTER 1

GENERAL DESCRIPTION

The Spectrum Display Unit, RA. 6367, is essentially two Panoramic Adapters, RA. 6366, built into one chassis. The design is such that both displays are adjacent to each other at the center of the panel. This allows the display to be spread over an effective 5-3/4 inch by 1-1/8 inch screen size.

The RF SWEEP and RF CENTER controls on the front panel may be adjusted to present the first 500 kc portion of a 1 mc spectrum on the left hand trace and the last 500 kc portion of the same 1 mc spectrum on the right hand trace. The time base circuits of both traces are synchronized at four cycles per second and the net result is a 1 mc spectrum displayed over twice the screen length of the RA. 6366.

The RA. 6217 Receiver which is used in conjunction with the RA. 6367 feeds a signal into the Spectrum Display Unit to show the frequency to which the receiver is tuned. This appears as a negative pulse on the trace and moves with the KC dial on the receiver. The MC dial on the receiver displays the Megacycle Spectrum being displayed.

This equipment then has the unique capability of being able to select any signal in the HF spectrum by moving the receiver tuning marker to the desired signal, which may be displayed on either trace. Then by switching the other trace to IF it is possible to analyze the signal in a narrow band mode while still viewing it in a wideband mode. The narrow band mode when using a standard RA. 6217A is dependent on the setting of the IF KC control. This narrow band capability can be expanded by using an RA. 6217C which has a 75 kc IF output. In the IF position the signal in the center of the trace is the one that the receiver is tuned to and the displayed IF spectrum will move as the KC dial is turned.

In either RF or IF operation, the sweep width controls may be used to expand the trace to permit closer analysis of a desired signal. Thus, it is possible to view a signal in the 75 kc position on one of the traces and then to switch the other trace from RF to IF and view the same signal in an expanded trace configuration.

If desired, the RA. 6367 may be used with two receivers to display two independent megacycle bands on each trace with the full versatility of an RA. 6366.

The power supply for the S. D. U. is self-contained and does not rely on the RA. 6217 for its power. The jacks at the rear of the unit are separate for each trace and must be connected in parallel for operation from a single receiver.

RA-8307

CHAPTER 1

GENERAL DESCRIPTION

RA. 6367

CHAPTER 2

INSTALLATION

1. After unpacking the Spectrum Display Unit, inspect it and the CRT's for any visible signs of damage. Normally the unit should be mounted directly above the RA. 6217 Receiver in a standard 19 inch relay rack using the mounting holes provided.

2. Power Supplies

a) AC Power Unit

Ensure that the voltage selector switch at the rear of the unit is in the correct position consistent with the supply voltage being used. Check that the fuses are correct as follows:

F1 - 0.5 amp slow-blow
F2 - 1.5 amp slow-blow

b) DC to DC Converter (Optional)

Ensure that the voltage selector switch at the rear of the panel is in the correct position consistent with the battery voltage being used. Check that the fuses are correct as follows:

F1 - 2.0 amp slow-blow
F2 - 1.0 amp slow-blow

3. Connections to RA. 6217

Coaxial Connections:

	RA. 6367		RA. 6217	
(a)	2 - 3 mc in	(J201 - J203)	2 - 3 mc out	(J104)
(b)	2nd VFO in	(J202 - J204)	2nd VFO out	(J107)
(c)	1. 6 mc in	(J101 - J104)	1. 6 mc out	(J3004)
(d)*	1. 6 mc WIDE in	(J102 - J104)	1. 6 mc WIDE out	(J113)

*NOTE: The coaxial connections shown in (d) are installed only on the RA. 6217C receiver. This provides signal of 75 kc bandwidth for visual display and is used instead of the cable in (c). Only one of the cables in (c) and (d) should be connected to the RA. 6367 at any one time. In some installations a shielded switch has been provided to switch inputs from NARROW to WIDE. The RA. 6217A receiver does not have the 1. 6 mc WIDE out connector (J113).

RA-6847

CHAPTER 2

INSTALLATION

1. After unpacking the Spectrum Display Unit, inspect it and the CRT's for any visible signs of damage. Promptly file any claims for damages directly with the carrier. The RA-6847 Receiver is standard 19 inch relay rack using the mounting holes provided.

2. Power Supplies

a) AC Power Unit

Ensure that the voltage selector switch at the rear of the unit is in the correct position consistent with the supply voltage being used. Check that the fuses are correct as follows:

F1 - 0.6 amp slow-blow
F2 - 1.6 amp slow-blow

b) DC to DC Converter (Optional)

Ensure that the voltage selector switch at the rear of the panel is in the correct position consistent with the battery voltage being used. Check that the fuses are correct as follows:

F1 - 2.0 amp slow-blow
F2 - 1.0 amp slow-blow

3. Connections to RA-6217

Coaxial Connections:

RA-6847		RA-6217	
(a)	2 - 3 mc in (1201 - 1203)	2 - 3 mc out	(1104)
(b)	2nd VFO in (1202 - 1204)	2nd VFO out	(1103)
(c)	1.6 mc in (1101 - 1106)	1.6 mc out	(1200)
(d)*	1.6 mc WIDE in (1102 - 1105)	1.6 mc WIDE out	(1119)

*NOTE: The coaxial cables shown in (d) are installed only on the RA-6217 receiver. The purpose is signal of 1.6 mc bandwidth for visual display and is used instead of the cable in (c). Only one of the cables in (c) and (d) should be connected to the RA-6847 at any one time. In some installations a ganged switch has been provided to switch cables from RA-6847 WIDE. The RA-6217A receiver does not have the 1.6 mc WIDE out connector (1119).

TECHNICAL SPECIFICATIONS

Function:

To provide a visual display of signals in any selected 1 mc frequency band when used with the RA. 6217 Receiver. This capability can be extended down to 3 kc with the RA. 6337 Low Frequency Converter.

Input Frequencies:

RF Mode: 2 - 3 mc
IF Mode: 1. 6 mc ±37. 5 kc

Swept Frequency Range:

RF Mode: Adjustable from 100 kc to 1 mc
IF Mode: Adjustable from 7. 5 kc to 75 kc

Resolution:

RF Mode: Capable of separating two equal amplitude signals spaced 10 kc apart.
IF Mode: Capable of separating two equal amplitude signals spaced 1 kc apart.

Sweep Rate:

4 cycles per second.

Sensitivity:

With gain control set to maximum a 1 microvolt input signal to the RA. 6217 Receiver will provide:

(a) At least 1/4 full scale deflection in the RF1 mode with the RF sweep set for 100 kc.

(b) At least 1/4 full scale deflection in the RF2 mode with the RF sweep set for 1 mc.

(c) At least 1/2 full scale deflection in the IF mode.

Frequency Markers:

(a) A moveable marker indicates the frequency to which the RA. 6217 is tuned. This is operable only in the RF modes.

(b) Fixed markers at 100 kc intervals derived from the receiver calibrator.

RA. 6217

TECHNICAL SPECIFICATIONS

Function

Input Frequencies

Sweep Frequency Ranges

Resolution:

Sweep Rate:

Sensitivity:

Frequency Markers:

	(c) IF center frequency marker derived from the receiver calibrator.
Display:	Two rectangular cathode ray tubes with 2-3/4" by 1-1/8" screen. Each has a blue-white fluorescence with long persistence. The face of the tubes are covered with a green plexiglas screen with engraved marks in the center and at each end.
Spurious Responses:	With a 1 microvolt reference input to the RA. 6217 Receiver all spurious responses appearing on the CRT will be at least 50 db below the signal displayed.
Power Supply:	(a) Line, 100 - 125V or 200 - 250V, 48 - 420 cps (Standard)
	(b) DC Inverter for operation from 9 - 30 volts DC with either line at ground (Optional Extra)
Environmental Conditions:	Temperature: Operating +55°C to 0°C Storage +70°C to -40°C
	Altitude: Operating 10,000 feet Storage 30,000 feet
Dimensions:	17" x 3-1/2" x 17" with 19" rack mount front panel.
Weight:	25 pounds
Rear Connections:	(a) Power cord supplying 8' cord three wire grounding plug.
	(b) Two 2 - 3 mc IN Two 2nd VFO IN Two 1.6 mc IN Two 1.6 mc WIDE IN

CHAPTER 3

OPERATION

NOTE TO OPERATORS

When the unit is switched OFF and then immediately switched ON, the trace may not reappear. If this occurs, switch the unit OFF and wait approximately 15 seconds for the power circuits to discharge before switching the unit ON. The fore-going method should obtain the trace; however, in extreme cases, it may be necessary if the above does not work, to operate the OFF-INTENSITY control in rapid fashion from ON-to-OFF-to-ON in order to obtain the missing trace line.

CHAPTER 3

OPERATION

Operation of right and left hand display units is identical, thus the control functions of only one unit are described here.

Reference to the controls are in accordance with the front panel titles adjacent to them.

Function of Controls

RF Sweep	This control adjusts the sweep width of the RF spectrum which can be varied from 1 mc (fully clockwise), down to 100 kc.
RF Center	With this control, the positions of the displayed RF spectrum can be shifted horizontally on the CRT only when the selector switch is in RF-1 or 2.
Intensity/Off	This dual function control switches on power to the unit and is also used to vary the trace intensity. Intensity of the trace increases with clockwise rotation of the control.
Focus	The definition of the displayed trace is adjusted using this control.
RF-1	This RF narrow band position provides for the resolution of two RF signals separated by 1 kc or more. When operating in this mode, the RF sweep width should be reduced to 100 kc (fully counter-clockwise).
RF-2	This RF wide band position is used to observe RF spectrum from 1 mc to 100 kc by varying the RF sweep width for the desired spectrum width. This position provides for the resolution of two RF signals separated by 10 kc or more.
IF	This position enables observation of various IF spectrum widths, depending on the IF bandwidth setting of the receiver. This position provides for the resolution of 2 signals separated by 1 kc or more. In this position the receiver tuning marker is disconnected.
IF Center	This control adjusts the horizontal position of signals when the RF/IF switch is in IF.

IF Sweep	This control is used to adjust the IF sweep width which varies from approximately 75 kc (fully clockwise) down to 7.5 kc, only when RF/IF switch is in IF.
Horizontal	This control is used to shift the displayed trace left or right on the CRT.
Vertical	With this control the displayed trace can be shifted up or down on the CRT.
IF Gain	This control adjusts the gain of the displayed signal; maximum gain is fully clockwise.
Marker On/Off	This switch enables use of the receiver tuning marker in RF-1 and RF-2 only.

Preliminary Settings:

The following control settings should be made with the power off and with all interconnections correctly connected between the panoramic adapter and the receiver.

1. Rotate the RF Sweep control fully clockwise.
2. Rotate the IF Sweep control fully clockwise.
3. Set the Horizontal and Vertical position controls to mid-range.
4. Set the RF and IF center controls to mid-range.
5. Set the RF/IF Selector to "RF-2".
6. Set the Marker switch to "ON".
7. Rotate the IF Gain control fully clockwise.
8. Switch on the receiver and the panoramic adapter.
9. Adjust the Intensity and Focus controls for a suitable trace, i.e. approximately mid-range.
10. Adjust the Vertical position for a trace along the etched line near the bottom of the CRT.
11. Adjust the Horizontal position until the trace is centered and extends to both edges of the CRT.

When the above settings have been made, a negative square wave (marker) should appear on the CRT.

12. Switch the RA.6217 receiver to MAN and set the receiver controls as follows:

R.F. MC	WB
R.F. ATTENUATOR	MIN.
MC Dial	5
2nd V.F.O.	INT.
KC Dial	.500
DET. -B.F.O. Mode	A.M.
I.F. BW KC	3
A.F. GAIN	Fully clockwise
I.F. GAIN	Fully clockwise

RF Mode Calibration

1. Make the preliminary settings listed above and adjust the RF CENTER control to center the tuning marker on the CRT.

2. Switch the RA.6217 to CAL. with the receiver KC dial set to 500 KC, eleven pips (100 kc markers) should appear on the trace.

3. Vary the KC dial on the RA.6217 from 0 kc to 1000 kc and ensure that the tuning marker is at the extreme left at 0 kc and at the extreme right at 1000 kc.

4. Connect a 1 microvolt, 2.5 mc signal to the receiver RF input and note that a positive "pip" approximately 1/4 inch high appears above the marker pulse.

5. With the signal centered, rotate the RF SWEEP control counter-clockwise and observe that the sweep width narrows, from 1 mc down to 100 kc, i.e., the signal pip opens up but remains sensibly centered on the CRT.

6. Switch the selector to "RF-1" and note that a narrower spectrum signal appears slightly lower in amplitude. This is caused by the crystal filter now in the circuit.

IF Mode Calibration

1. Switch the RF/IF switch to IF and note that the marker pulse disappears. Turn the IF SWEEP control fully clockwise. Adjust the IF CENTER control to obtain a response in the center of the trace. Set the Receiver IF Bandwidth to maximum.
USE CRYSTAL CALIBRATOR

2. Move the KC dial on the receiver and observe that the two moving pips converge on a fixed one in the center of the trace.

3. Move the KC dial until the largest pip is at the right hand side of the trace. Note this figure in KC. Then, move the KC dial until the same pip is at the left hand side of the trace and note the corresponding figure in KC. Subtract this figure from the first reading. This will be the maximum sweep width in the IF position.

4. Turn the IF SWEEP control fully counter-clockwise. The pip should increase (open up) in width at the center. Slight adjustment of the IF center control may be necessary.

5. Move the KC dial until the response is at the right hand edge. Note the figure in KC. Move the KC dial until the response is at the left hand edge of the trace. Subtract this figure from the first one. This difference should be less than 10 kc indicating the minimum sweep width in the IF position.

Display of Individual Signals

The IF position of the selector switch provides the capability of looking at any discrete portion of the RF spectrum. The following procedure is used to observe a selected portion of the RF spectrum without moving the RF center control from its correct setting.

1. With the selector switch in the RF-2 position and the Marker switch ON, tune the receiver precisely to the desired signal of the RF spectrum, using the receiver tuning marker that is displayed on the CRT.

2. Set the selector switch to the IF position. The desired signal pip will appear in the center of the CRT without the tuning marker. A slight adjustment of the receiver KC control may be necessary to obtain maximum amplitude of the displayed signal.

3. An analysis of the desired signal is then possible by adjusting the sweep width control.

IF Bandwidth Capabilities

1. When the Spectrum Display Unit (SDU) is used with an RA.6217A type receiver, the bandwidth of displayed signals is limited by the setting of the IF Bandwidth switch on the receiver. This means that 13 kc spectrum or less can be analyzed. (J3004 connected to J101 and J103)

2. When the SDU is used with an RA.6217C type receiver the bandwidth of displayed signals is limited to the value shown on the IF Bandwidth switch of the receiver. This means that a 20 kc spectrum or less can be presented on the CRT. (J3004 connected to J101 and J103) Do not connect a cable to J113 for this capability.

3. An additional "1.6 MC WIDE" output connector on the RA.6217C (J113 for connection to J102 and J104) provides a 75 kc spectrum for display, centered in accordance with the position of the KC dial on the RA.6217C. When using this output the cable used to provide capability 1 and 2 above must be disconnected.

Split Display of the 1 Mc Spectrum

The 1 mc spectrum display may be divided into two separate 500 kc segments for display on the left and right hand CRT's as follows: Make the preliminary settings listed above for the display unit. Set the receiver function switch to CAL and the IF gain to maximum.

Left Hand Unit

(1) Set the selector switch to the RF-2 position.

(2) Using the RF sweep control, reduce the sweep from 1 mc to 500 kc (about mid-position) counting the six 100 kc pips to indicate a 500 kc spread.

(3) Using the RF center control, move the 500 kc marker to the right hand edge of the CRT.

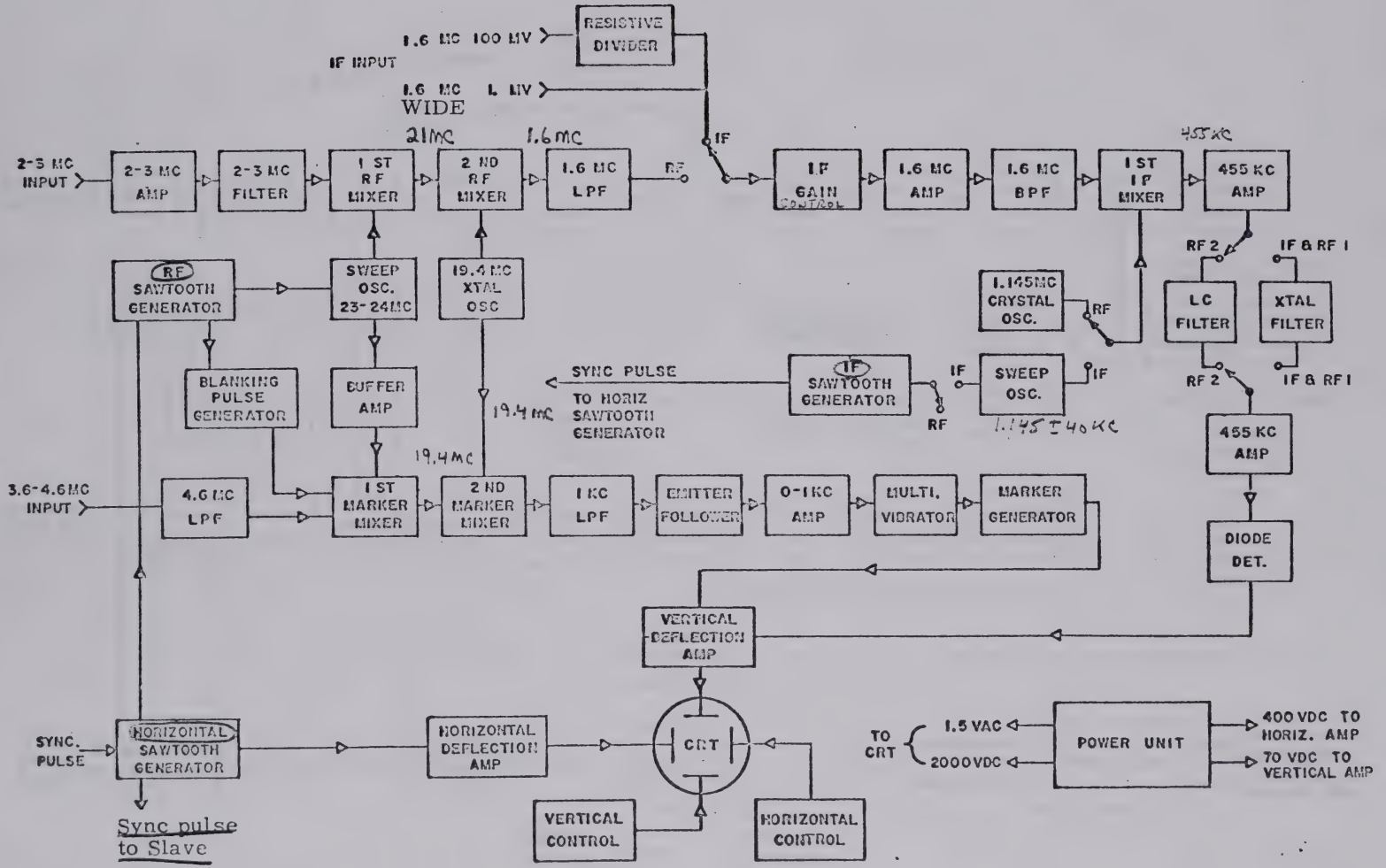
Right Hand Unit

(1) Set the selector switch to the RF-2 position.

(2) Reduce the sweep width from 1 mc to 500 kc using the RF sweep control.

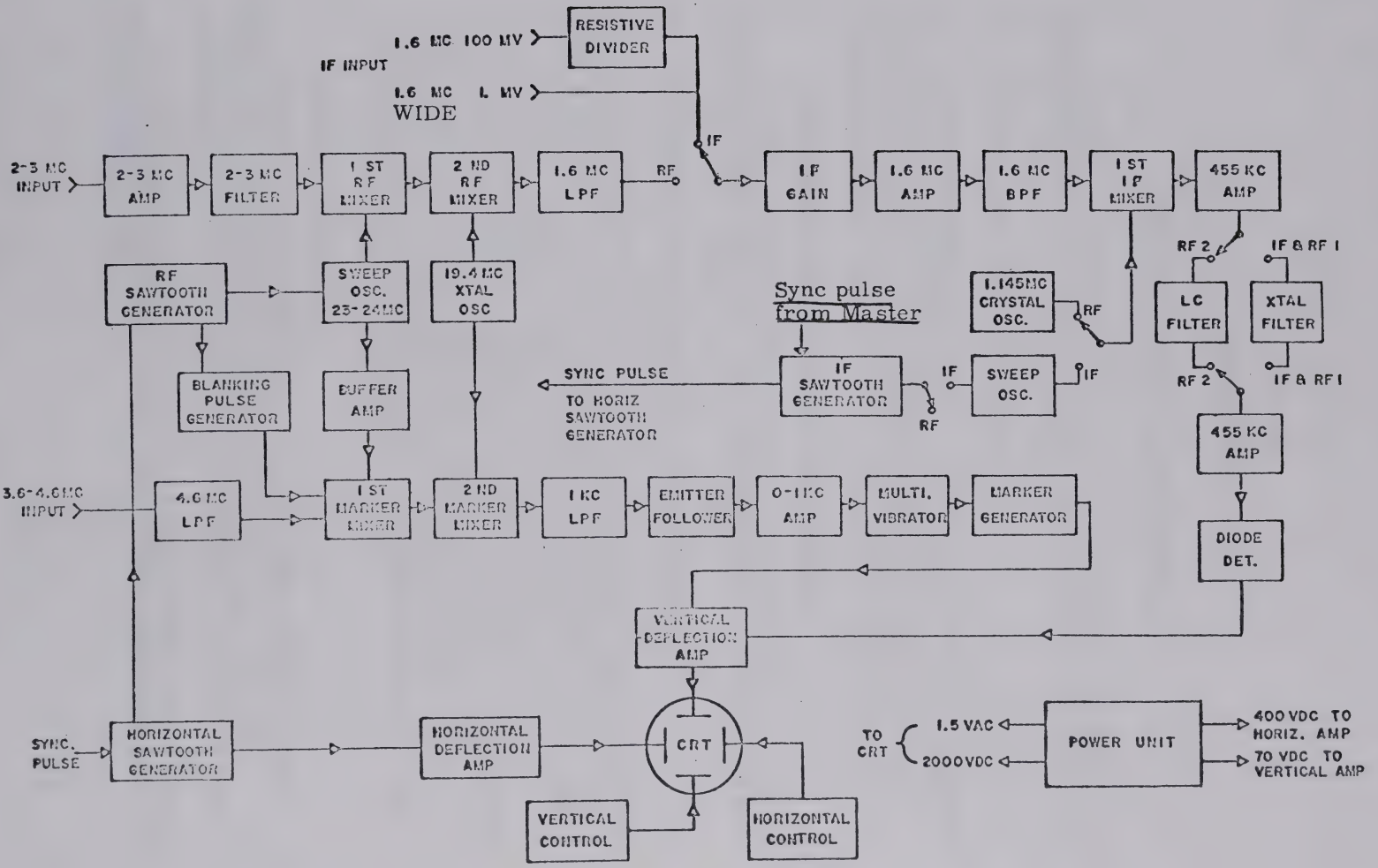
(3) Using the RF center control, move the 500 kc marker to the left hand edge of the CRT.

Check these control settings by tuning the receiver KC control through 1 mc spectrum and watching the tuning marker move across both CRT's.



BLOCK DIAGRAM

MASTER SPECTRUM DISPLAY UNIT RA. 6367



BLOCK DIAGRAM

SLAVE SPECTRUM DISPLAY UNIT RA. 6367

RA.6367

CHAPTER 4

BRIEF TECHNICAL DESCRIPTION

1. With the aid of the block diagram, this chapter briefly describes the basic operation of the dual display unit. Since left and right hand units are identical, only one is described here.

2. RF Amplifier and 1st RF Mixer

The output from the RA. 6217 second mixer, which has a spectrum from 2 - 3 mc, is applied to the 2 - 3 mc amplifier in the RA. 6367. The amplifier output is fed through a 2 - 3 mc BPF and combined in the 1st RF mixer with 23 - 24 mc from the sweep oscillator. The resultant frequency difference of 21 mc is fed to the 2nd RF mixer.

3. 2nd RF Mixer and 19.4 mc Crystal Oscillator

The 21 mc fed to the 2nd RF mixer is combined with 19.4 mc from the crystal oscillator. The resultant frequency of 1.6 mc is then fed through a low pass filter to the IF module.

4. IF Module, 1.6 mc Amplifier and 1st IF Mixer

A 1.6 mc signal from the RF module or the receiver is selected by the RF/IF switch on the front panel and is fed through the front panel gain control to the 1.6 mc amplifier and bandpass filter to the 1st IF mixer. In the RF position the mixer combines 1.145 mc from the IF crystal oscillator with 1.6 mc to produce 455 kc. In the IF position the RF section is switched out and the 1st IF mixer then combines the 1.6 mc signal from the RA. 6217 with the sweep oscillator signal (1.145 mc ±40 kc) to produce 455 kc. The 455 kc is then amplified and fed through either the crystal filter or the LC filter which is selected by the RF/IF switch. The 455 kc is then fed via a final IF amplifier and diode detector to a vertical amplifier and then to the Y deflection plates on the CRT.

5. Sawtooth Generators

The horizontal sawtooth generator receives a synchronizing pulse from the IF sawtooth generator and produces a time base deflection voltage which is amplified in the horizontal deflection amplifier and fed to the X or horizontal deflection plates on the CRT.

The horizontal sawtooth generator also supplies a synchronizing pulse to the RF sawtooth generator, thus all three sawtooth generators are in synchronization.

6. Synchronization of Sawtooth Generators

A. The synchronization of both master and slave traces in this display unit is such that both traces start simultaneously. This is not visibly apparent and the effect is one of a continuous trace. For example, a signal spectrum occupying both traces appears as it would on a single CRT of twice the length.

B. The master I.F. sawtooth generator is free running at a rate which depends on its sweep rate setting. This rate is normally set at 4 cps. A synchronizing pulse is taken from the I.F. sawtooth generator and fed to the horizontal sawtooth generator. Here the sweep rate of the horizontal sawtooth generator is set (normally at 4 cps), which puts it in synchronization with the I.F. sawtooth generator. The trigger pulse derived from the horizontal sawtooth generator is used to synchronize the R.F. sawtooth generator. The sweep rate of the R.F. sawtooth generator is then adjusted to lock-in with the other two generators. The synchronizing pulse which drives the master horizontal sawtooth generator is also fed to the I.F. sawtooth generator in the slave unit. Thus, the slave I.F. sawtooth generator is not free running but is locked-in with the synchronizing pulse from the master unit. The sweep rate of the slave I.F. sawtooth generator is set to 4 cps. In a similar manner the synchronizing pulse is fed to both the slave horizontal sawtooth generator and the slave R.F. sawtooth generator. The sweep rates on both of these generators are set to 4 cps.

C. After setting all sweep rate potentiometers full synchronization of the slave and master units is obtained. This can be verified by observing that signals displayed in any mode do not drift across the screen. If any drifting occurs it will be necessary to make slight adjustments to the approximate sweep rate potentiometers until no drift is observed.

7. Sweep Oscillator (23 - 24 mc)

The RF sawtooth generator provides a sawtooth voltage to the RF sweep oscillator at a sweep rate of 4 cps. This sweep rate is set by an internal adjustment in the RF sawtooth generator. The oscillator sweeps from 23 - 24 mc and is fed to both the 1st RF mixer and the 1st marker mixer.

8. Receiver Marker

Part of the output from the second VFO (3.6 - 4.6 mc) in the RA.6217 is fed through a low pass filter (LPF) to the 1st marker mixer where it is combined with the output from the sweep oscillator (23 - 24 mc) to produce 19.4 mc.

A trigger pulse produced in the horizontal sawtooth generator is used to trigger a multivibrator which provides a negative blanking pulse to the base of the 1st marker mixer.

9. 2nd Marker Mixer and Marker Generator

19.4 mc from the 1st marker mixer is combined with 19.4 mc from the RF crystal oscillator in the 2nd marker mixer and fed through a low pass filter to produce a zero beat ±1 kc output. This signal is then amplified and fed to a multivibrator which produces a wide positive going square wave. This wide pulse width is necessary to prevent double pulsing of the marker generator by the audio signal on either side of zero beat. The square wave is then integrated to produce a positive spike used to trigger the third multivibrator. This multivibrator produces a positive square wave marker which is fed to the IF and detector module. The marker pulse is then fed simultaneously with the detected signal to the Y-deflection plates of the CRT.

As the RA. 6217 is tune (KC) the 2nd VFO frequency (3.6 - 4.6 mc) varies the position of the marker pulse with respect to the 23 - 24 mc horizontal time base.

10. Power Unit

This contains a DC to DC converter which produces the high voltages necessary to operate the CRT.

CHAPTER 5

DETAILED CIRCUIT DESCRIPTION

1. To simplify the understanding of the panoramic adapter, it should be regarded as three sub-units, namely the RF signal channel, the IF signal channel, and the calibration marker circuits plus the power unit.

Interconnections and Input Circuits

2. RF and IF connections from the RA. 6217 are made via coaxial cables to the signal channels and marker circuits of the panoramic adapter. While cable lengths are not critical, excessive extensions will attenuate the spectrum signals and/or detune the 4. 6 mc low pass filter.

RF Amplifier and First RF Mixer - Dwg. G-02312

3. The RF signal channel input consists of a frequency spectrum from the RA. 6217 second mixer of 2 - 3 mc. This is fed via R338, L301, and C307 to the base of the 2 - 3 mc amplifier, Q301. The amplifier is capacitively coupled via C311 to the 2 - 3 mc band pass filter (A1 through A7) which sharply attenuates frequencies outside this range and feeds the signal spectrum via C323 to the base of the first Q304. Transistor Q304 combines the 2 - 3 mc spectrum signal with the 23 - 24 mc sweep signal output of the sweep oscillator, Q303. The difference frequency, 21 mc, is then fed to the 2nd RF Mixer via tuned transformer assembly, T301, T302, etc. Preset capacitors C324 and C331 are used to tune the transformer filter to 21 mc.

23 - 24 Mc Sweep Oscillator

4. The sweep oscillator circuit includes the transistors Q302, Q303, the variable capacity diode CR301, and the inductor L2. The feedback necessary to sustain oscillation is provided via C317 and the DC supply is regulated by VR301. A variable DC potential is fed from the RF center potentiometer via E305 to one side of CR301 and a variable amplitude sawtooth is fed to the opposite side from the RF Sweep potentiometer via E306. Outputs are taken from the collector of Q303 and the capacitive divider C313, C314 to feed the first RF Mixer and Marker circuits respectively.

2nd RF Mixer

5. The first (Q304) and second (Q305) RF mixers are coupled together by a 21 mc filter consisting of two tuned transformer assemblies, T301, T302 and their associated capacitors. Preset trimmer capacitors C324 and C325 are used to tune the filter to 21 mc. The filter output is fed to the base of the 2nd RF mixer, Q305. 19. 4 mc from the crystal controlled oscillator Q306 is fed to the emitter of Q305 from tap 3 on the tuned coil assembly L304 via R337 and C335. The resultant frequency difference of 1. 6 mc is then fed via a 1. 6 mc low pass filter consisting of L303 and C336 to the IF module.

19.4 Mc Crystal Oscillator

6. The transistor Q306, the crystal Y301, and the tuned circuit L304, C337, C338 constitute a conventional crystal oscillator circuit. Outputs are taken from suitable inductive and capacitive taps on the tuned circuit to feed the second RF Mixer and Marker circuits. The second 19.4 mc signal from the crystal controlled oscillator Q306 is fed from the junction of C337 and C338 on the tuned coil assembly L304 to the emitter of the second marker mixer Q404.

IF and Detector Module - Dwg. G-02191

7. 1.6 mc from the RF module or the receiver is selected and switched through relay K601 to the IF gain control and then via C603 to the 1.6 mc amplifier Q601.

After amplification the signal is fed via C605 to a 1.6 mc band pass filter consisting of tuned coils L601, L602, assemblies A601, A602 and capacitors C606, C608.

1st IF Mixer and Filters

8. Capacitor C609 couples the 1.6 mc signal from the band pass filter to the base of Q602. 1.145 mc is fed to the emitter from the crystal oscillator when the selector switch is in the RF position, or from the sweep oscillator when in the IF position.

The resultant IF difference of 455 kc is then fed to the tuned primary winding of T601. Capacitor C613 couples the 455 kc from the transformer secondary winding to the base of IF amplifier Q603. R622 is an internal gain adjustment used to set the gain of the 455 kc amplifier.

The 455 kc signal is passed from Q603 through relay K602 to either the LC filter or the crystal filter depending on the position of the selector switch. When the selector switch is in the RF1 or IF position the crystal filter is in the circuit. Since the crystal filter bandwidth is only 500 cps, the RF1 position is useful only when the RF sweep width is reduced to 100 kc. When the selector switch is in the RF 2 position, the LC filter is in the circuit. Since the bandwidth of the LC filter is approximately 10 kc, this filter may be used for any setting of the RF sweep width control. After filtering, the 455 kc signal is further amplified by Q604 and fed through tuned transformers T602 and T603 to the diode detection stage and voltage doubler consisting of CR601, CR602, C627, and C628.

Diode Detector and Vertical Amplifier

9. All signals appearing at the input of the detector circuit (C627) are both positive and negative. It is not necessary to display the entire signal since one-half mirrors the other, so the signals are detected or rectified and doubled producing a positive going spectrum which is then fed to the vertical amplifier. Potentiometer R635 is used

to adjust the gain of the detected signal while potentiometer R639 is pre-set to adjust the emitter bias preventing saturation or cut-off of Q605.

The detector circuit provides a linear output to the vertical deflection amplifier which feeds the vertical deflection plates on the display tube. Positive square wave pulses from the marker module are also fed to the vertical deflection circuit via terminal E615 through resistor R637 and out via terminal E613.

IF Sawtooth Generator and 1.145 Mc Oscillator - Dwg. G-02180

10. Unijunction transistor Q701 and emitter follower Q702 form a relaxation oscillator producing a non-linear sawtooth voltage which is fed via R709 through the IF sweep width control and relay K701 (when in the IF position) to the varicap CR701 where it is used to vary the voltage and therefore the capacitance thus varying the frequency of the 1.145 mc oscillator. In the RF position the sawtooth voltage is eliminated and the oscillator is then crystal controlled. This sawtooth voltage is also tapped from the emitter of Q702, integrated and fed to the horizontal sawtooth generator for use as a synchronizing pulse.

The 1.145 mc oscillator signal is fed via terminal E712 to the 1st IF mixer.

Potentiometer R705 is pre-set to adjust the sweep rate (approximately 250 msec) of the sawtooth generator. R706 is used to adjust the linearity of the sawtooth voltage and thus compensate for the non-linearity in varicap CR701.

The DC balance potentiometer R710 is adjusted so that a change in the amplitude of the sawtooth voltage will not cause a shift in the mean DC reference level. Potentiometer R711 is used to pull the frequency of the crystal controlled oscillator.

Horizontal Sawtooth Generator - Dwg. G-02216

11. The synchronizing pulse from the IF sawtooth generator is fed via C801, emitter follower Q801 and C803 to the second base of the unijunction transistor Q802 where it is used to trigger the horizontal sawtooth generator. Potentiometer R807 is pre-set to adjust the sweep rate by adjustment of the RC time constant. Potentiometer R808 adjusts the linearity of the sawtooth voltage and potentiometer R813 provides for the DC balance adjustment while potentiometer R812 is used to set the horizontal gain (dispersion) of the trace. From the wiper of potentiometer R812 the horizontal voltage is fed to the horizontal deflection amplifier Q804 and then via terminal E807 to pin 2 (horizontal plate) of

the display tube. Potentiometer R815 is used to pre-set the emitter bias on Q804. The sawtooth voltage produced by Q803 is integrated by C807 and fed to the emitter-follower stage Q805. The trigger pulse output of Q805 is then applied via C810 to the unijunction transistor Q806 where it is used to sunchronize the RF sawtooth generator. It is also fed via terminal E808 to the marker board where it is used to trigger the blanking pulse generator. Potentiometer R823 is used to adjust the sweep rate of the RF sawtooth generator and potentiometer R824 is used to adjust the lin linearity of the sawtoothtvoltage.

Receiver Marker Circuits Dwg. G-02314

12. The 3.6 - 4.6 mc 2nd VFO output from the companion receiver is fed via a 4.6 mc low pass filter consisting of tuned assemblies A401, A402, and capacitors C401, C403, and C405 to the base of the 1st marker mixer Q405. A 10 volt negative blanking pulse is also fed to the base of Q405 which cuts off the transistor during the flyback period of the sweep oscillator. The blanking pulse is generated by multivibrator Q401 and Q402 which is triggered by a pulse from the horizontal sawtooth generator. The 4.6 mc LPF output is fed to the base of Q405 and the sweep oscillator output (23 - 24 mc) is injected at the emitter of Q405 from buffer amplifier Q408.

The mixer output is 19.4 mc ± a discrete band of frequencies. This frequency band is determined by the double tuned circuit T401 and T402. This band of frequencies which is centered about 19.4 mc is then fed via the capacitive divider C416 and C417 to the base of the 2nd marker mixer Q404. 19.4 mc from the crystal oscillator on the swept RF board is injected to the emitter of Q404. The output of Q404 is a zero beat ± a discrete band of frequencies which is passed through a 1 kc LPF (R423 and C411) and then via C413 to emitter follower Q406. The signal is then fed via C418 to the final amplifier Q407. The output of Q407 is then passed through C421 and CR402 and triggers the 1st multivibrator Q409 and Q410. The output of the 1st multivibrator has a pulse width of approx. 200 milliseconds and is integrated by C428. The integrated positive pulse is fed via CR403 and triggers the 2nd multivibrator Q411 and Q412. The output of the 2nd multivibrator is the marker pulse seen on the CRT. This narrow negative pulse is approximately 5 milliseconds wide. Because of its narrow pulse width, if the zero ±1 kc signal is fed directly to the 2nd multivibrator, both the zero-1 kc and zero +1kc signal would trigger the 2nd multivibrator thereby producing an extraneous marker pulse. The 1st multivibrator prevents double pulsing because its wide pulse width is triggered only by the zero -1 kc signal and produces only one trigger pulse for each sweep cycle.

Power Supply

13. The fused (F1) AC power supply is filtered by capacitor C1 and C2 and taken to the voltage selector switch S1. The switch connects the split primary windings of T1 in series for 234 volts or in parallel for 117 volts operation. The secondary winding is also fused (F2) and provides 22.6 volts AC output which supplies the voltage for the indicator lamp and feeds two full wave bridge rectifiers, CR1 and CR2.

The bridge rectifier CR1 feeds resistor-capacitor filter R2, C3, C4 and then a preregulator comprised of Q1, CR2, CR3, CR4, R3 and R4. The prerefulator provides a constant current to the collector of the DC comparison amplifier Q3 and the base of the control amplifier Q2. The comparison element Q3 takes a sample of the output voltage derived from VR1 and produces a signal proportional to the difference. This signal is amplified by Q2 and applied to the series regulator Q4 to control the output voltage. Potentiometer R7 is used to adjust the output voltage to -16 volts. In the event of regulator failure, the receiver is protected by the zener diode VR2 (18 volts) from serious voltage overload.

The second bridge rectifier CR5 provides -16 volts unregulated which actually is -21 to -40 volts DC. This voltage is used for the operation of the high voltage power supplies.

14. The power required to operate the panoramic adapter is derived from the AC power supply. When operating on AC line voltage, there are two negative DC voltages fed via cables to the high voltage power supplies. They are as follows:

(1) -16 V DC regulated

(2) -21 V to -40 V DC unregulated
(-16 V unregulated terminal)

During line operation, the unregulated DC voltage (-21 to -40 V) from the AC power supply is fed to a series voltage regulator in the high voltage power supplies. Potentiometer R902 is used to set the output voltage at -16.0 volts at Test Point 902 on each of the high voltage power supplies.

The high voltage power supplies (inverters) provide the following three outputs:

(1) A 1.5 volt RMS output which is fed to the filaments of the CRT (pin 3 and pin 8).

(2) A -2000 VDC which is fed through a resistive divider network to ground. Included in this divider are the intensity (pin 3) and focus controls (pin 5). -2000 VDC is also fed directly to the grid (pin 4) of the CRT.

(3) 400 volts DC is fed to a 290 volt zener diode regulator chain consisting of VR902, VR903, and VR904. The 290 volt supply is then fed in parallel to the horizontal position control (pin 1), the vertical position control (pin 7) and also to the horizontal sweep amplifier. Both the horizontal and vertical control circuits are resistive divider chains. Included in the zener chain is a 70 volt DC tap which supplies the vertical amplifiers.

CHAPTER 6

REPRESENTATIVE TEST DATA

SECTION

1. HIGH VOLTAGE POWER UNIT
2. HORIZ. AND R.F. TIME BASES
3. IF AND DET.
4. IF SWEEP
5. SWEPT R.F. STAGES
6. MARKER
7. MAIN CHASSIS
8. LOW VOLTAGE POWER UNIT

The test data given in this section contains all the voltage levels needed to locate a fault.

This section is supplementary to the FAULT DIAGNOSIS chapter and should only be used if a fault cannot be located using the FAULT DIAGNOSIS chapter.

Stage gains will also be found in the Alignment Procedures.

1. HIGH VOLTAGE POWER UNIT - Dwg. G-02231

WARNING: Care must be taken when measuring voltages in this unit.

Check Point	Value
E1	-16V
E3	-2000V with 1.5V RMS
E4	-2000V with 1.5V RMS
E5	-2000V
E7	+400V
E2	-30V
E9	-16V
E19	+300V
E10	+70V
E11	-16V

2. HORIZ. AND RF TIME BASES - Dwg. C-02216

All waveforms in this section occur at a rate of 4 cycles per second as shown below.

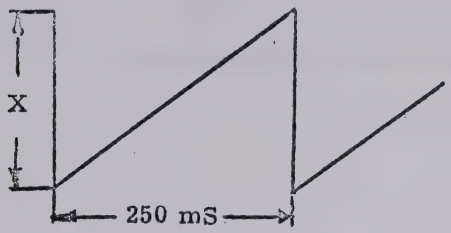


FIG. 1

This waveform is the one most common on the board and will be referred to as Fig. 1. The amplitude of the waveform, X, will be given.

DC Voltages - Base = B, Emitter = E, Collector = C

Check Point	Value
E1	-16V
E4	-16V
Q1 B	-5V
Q1 E	-5V
Q1 C	-15V
Q3 B	-9V
Q3 E	-9V
Q3 C	-3V
Q4 B	-9V
Q4 E	-10V
Q4 C	+150V
Q5 B	-5V
Q5 E	-5V
Q5 C	-15V
Q7 B	-10V
Q7 E	-10V
Q7 C	-3V

AC Waveforms

Check Point	Value
E2	Fig. 1, X = 7V
Q1 E	X = 5V, no sweep
Q3 B	Fig. 1, X = 5V
TP 1	Fig. 1, X = 4V
E7	Fig. 1, X = 250V

Check Point	Value
Q5 B	X = 4V, no sweep
Q5 E	X = 4V, no sweep
Q7 B	Fig. 1, X = 5V
E5	Fig. 1, X = 4V
E8	X = 7V, no sweep

3. I.F. AND DET. - Dwg. G-02191

Base = B, Emitter = E, Collector = C

Check Point	Value
E1	-16V
E15	+70V
Q1 B	-4V
Q1 E	-3.8V
Q1 C	-12V
Q2 B	-1V
Q2 E	-0.8V
Q2 C	-15V
Q3 B	-4V
Q3 E	-3.8V
Q3 C	-16V
Q4 B	-4V
Q4 E	-3.8V
Q4 C	-15V
Q5 B	0V
Q5 E	−0.5V
Q5 C	+75V
E8 (RF1 or RF2)	200 mV at 1.145 MHz
E8 (IF)	200 mV at 1.145 MHz
E14 Input connected to 2nd VFO IN, marker on in RF2	+4V volt square wave 5 msec wide, four times each second

Stage Gains

From	To	Gain db
Q1 B	Q2 B	10
Q2 B	Q3 B	10
Q3 B	Q4 B	15
Q4 B	E13	35

4. IF SWEEP - Dwg. G-00180

Refer to Fig. 1 in Section 2 for some of the test data given.

DC Voltages

Base = B, Emitter = E, Collector = C

Check Point	Value
E1	-16V
Q2 B	-9V
Q2 E	-9V
Q2 C	-3V
Q3 B	-3V
Q3 E	-2.8V
Q3 C	-15V
Q4 B	-6V
Q4 E	-6V
Q4 C	-0.5V
E10 (IF)	-16V
E11 (IF)	-2V
E8 (IF)	-16V

AC Waveforms and Voltages

Check Point	Value
E4	Fig. 1, X = 4V
E5	Fig. 1, X = 0.5V
E6	Fig. 1, X = 4V
E7	X = E7, no sweep
Q2 B	Fig. 1, X = 7V
E12 (IF)	200 mV at 1.145 MHz
E12 (RF1 and RF2)	200 mV at 1.145 MHz

5. SWEPT RF STAGES, Dwg. G-02312

Base = B, Emitter = E, Collector = C

DC Voltages

Check Point	Value
E1 (RF1 & RF2)	-16V
Q1 B	-3.5V
Q1 E	-3.2V
Q1 C	-12.5V
E4	-6.5V
E5	-4.7V
E6	-8V
Q2 B	-2V
Q2 E	-1.5V
Q2 C	-13V
Q3 B	-4V
Q3 E	-4V
Q3 C	-13V
Q4 B	-4V
Q4 E	-3.8V
Q4 C	-13V
Q5 B	-4.5V
Q5 E	-4.3V
Q5 C	-13V
Q6 B	-2.3V
Q6 E	-2.5V
Q6 C	-13V

Refer to Fig. 1 in Section 2 for some of the test data given.

AC Waveforms and Voltages

Check Point	Value
E6	Fig. 1, X =
E9	200 mV at 23-24 MHz
E12	200 mV at 21 MHz

Stage Gains

From	To	Gain dB
E2	Q4 B	0
Q4 B	Q5 B	0
Q5 B	E10	0

6. MARKER

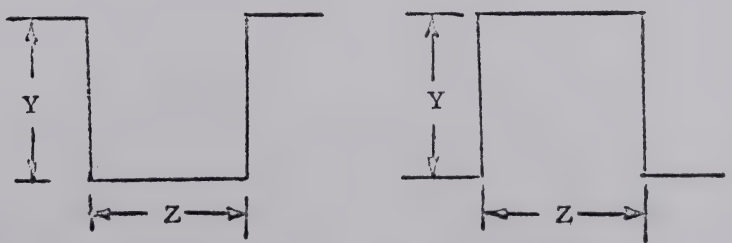
Many of the DC voltages measured here will be varying due to the nature of the circuitry. The average values will be given.

DC Voltages

Base = B, Emitter = E, Collector = C

Check Point	Value	Check Point	Value
E1 (RF1 & RF2)	-16V	E7 (Marker ON)	-16V
Q1 B	-16V	Q7 B	-0.75V
Q1 E	-16V	Q7 E	-0.6V
Q1 C	-1V	Q7 C	-9V
Q2 B	-16V	Q8 B	-6V
Q2 E	-16V	Q8 E	-6V
Q2 C	-16V	Q8 C	-15V
Q3 B	-0.5V	Q9 B	-16V
Q3 E	-1V	Q9 E	-16V
Q3 C	-15V	Q9 C	-13V
Q4 B	-0.75V	Q10 B	-16V
Q4 E	-0.75V	Q10 E	-16V
Q4 C	-6.5V	Q10 C	-5V
Q5 B	-4.5V	Q11 B	-16V
Q5 E	-4.5V	Q11 E	-16V
Q5 C	-15V	Q11 C	-0.5V
Q6 B	0V	Q12 B	-16V
Q6 E	0V	Q12 E	-16V
Q6 C	-15V	Q12 C	-16V
Q13 B	-4V	Q13 C	-15V
Q13 E	-4V		

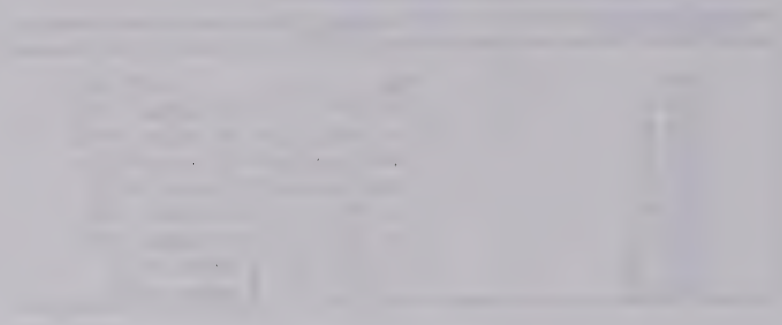
The AC waveforms on this board are mainly square or rectangular pulses. The following diagram defines the basic shape of these pulses. All occur 4 times each second.



-VE +VE

AC Waveforms and Voltages

Check Point	Value
E4	Fig. 1, X = 10V -VE
Q3 B	Y = 15V, Z = 20 mSec -VE
Q3 E	Y = 10V, Z = 20 mSec -VE
Q6 B	1 volt spike +VE and -VE
Q7 C	2 volt spike +VE and -VE
Q9 B	Y = 1V, Z = 40 mSec -VE
Q10 C	Y = 10V, Z = 60 mSec -VE
Q11 B	Y = 1V, Z = 5 mSec +VE
Q12 C	Y = 4V, Z = 5 mSec +VE



7. MAIN CHASSIS

The voltages given below are measured on the center arms of the following controls.

Check Point	Value
IF Center (IF)	-2V
IF Sweep (IF)	-9V
RF Center (RF1)	-4.5V
RF Sweep (RF1)	-8V
Vertical	+45V
Horizontal	+ 50V

8. LOW VOLTAGE POWER UNIT - Dwg. G-02945

D.C. Voltages

Base = B Emitter = E Collector = C

Check Point	Value
E11	-30V
E15	-30V
E3	-29V
Q1B	-29V
Q1E	-20.5V
Q1C	-16.5V
Q2B	-16.5V
Q2E	-6.5V
Q2C	-29V
Q3B	-6.5V
Q3E	-6.5V
Q3C	-16.5V
Q4E	-16V
Q4B	-16.5V
Q4C	-29V

CHAPTER 7

FAULT DIAGNOSIS

1. PRELIMINARY ANALYSIS
2. TRACE FAULTS
3. FAULT LOCATION USING RA. 6217 CALIBRATOR
4. TROUBLE SHOOTING THE I. F.
5. I. F. AND DET SECTION
6. I. F. SWEEP SECTION
7. TROUBLE SHOOTING THE R. F.
8. SWEPT R. F. SECTION
9. MARKER SECTION
10. HIGH VOLTAGE POWER UNIT
11. HORIZONTAL AND R. F. TIME BASES
12. MAIN CHASSIS
13. SYNCHRONIZATION
14. D. C. BALANCE
15. LOW VOLTAGE POWER UNIT

CHAPTER 7

FAULT DIAGNOSIS

1. PRELIMINARY ANALYSIS

This first check should be done before any covers are removed from the equipment to determine if the fault condition is internal or external.

(a) External Connections

Ensure that the coaxial cables from the RA.6217 receiver to the display are connected to the correct jacks. Switch on the RA.6217 and observe that the panel lights operate and are controlled with the DIMMER control. This will apply only if the receiver is operating with an A.C. power supply.

(b) Operation

Switch on the display. A high pitched whine should be heard indicating that the high voltage power units are operating. In extreme cases the display may have to be switched on and off twice, quite rapidly, in order to trigger the high voltage power unit.

2. TRACE FAULTS

If these preliminary checks prove satisfactory, a trace should appear on the face of each tube. Each trace should adjust up and down using its VERTICAL control, move from right to left using its HORIZONTAL control, brighten using its INTENSITY control and focus using its FOCUS control.

If the preliminary checks are successful, the correct D.C. potentials are being generated.

If these checks reveal some fault consult the following table for guidance.

(a) Fault Location on Trace (covers may have to be removed)

Fault	Check
No Trace	-16V at rear
No Trace	-16V unreg. at rear
No Trace	Ground connection
No Trace	High voltage P.U. Section 10
No Trace	Horiz. Amp. Section 11(ii)

Fault	Check
No Trace	Horiz. Control Section 12
No Trace	Vert. Amp. Section 5
No Trace	Vert. Control Section 11(ii)
No Trace	Tube Section 11(i)
Trace too short	High Voltage P.U. Section 10
Trace too short	Horiz. Amp. Section 11(ii)
Trace too short	Tube Section 11(i)
Trace too short	Horiz. Control Section 12
No intensity or focus	High Voltage P.U. Section 10
No intensity or focus	Tube Section 11(ii)
No intensity or focus	Intensity Control Section 11(ii)
No intensity or focus	Focus Control Section 11(ii)

3. FAULT LOCATION USING CALIBRATION SIGNALS

This section is not intended to be used for calibration of the trace but uses the built-in calibration facilities available in the RA.6217 as a means of finding where the fault lies. No covers should be removed at this time.

(a) Setting Up RA.6217

KC Dial	500
2nd VFO Int-Ext.	Int.
System Switch	Cal.
R.F. Gain	Fully Clockwise
I.F. BW	6 kc
Meter	R.F. Level

(b) Setting Up Display

Marker	On
R.F. Sweep	Fully Clockwise
R.F. Center	Mid-Range
R.F.-I.F. Switch	I.F.
I.F. Sweep	Fully Clockwise
I.F. Center	Mid-Range
I.F. Gain	Fully Clockwise
Intensity	Mid-Range

(c) Calibration of RA.6217

With the RA.6217 set up as described, the R.F. Level on the meter should be above 10. Adjust the CAL-FINE TUNE control to obtain a maximum reading on the meter. A headset plugged into the PHONES jack should produce a zero beat at this point. Check that the receiver produces a calibration signal at each 100 kc point across the KC dial. Return the KC dial to 500 kc.

This checks the calibration facility of the RA. 6217 and reference should be made to its handbook if this does not occur.

(d) Test of I. F. Section

With the RA. 6217 set up for a maximum R. F. LEVEL at 500 kc, a signal should be seen on the trace when the controls are set up as in 2(b). Adjust the I. F. CENTER control to place this signal in the center of the tube face.

This check tests the major part of the I. F. module of the display and the cables from the receiver. Note that one small part of the I. F. is not checked at this point.

(e) Fault Location on I. F. (covers may have to be removed)

Fault	Check
No signal in Cal.	Cables from receiver
No signal in Cal.	2(a) and 2(b)
No signal in Cal.	I. F. Center Section 11(ii)
No signal in Cal.	I. F. Sweep Section 11(ii)
No signal in Cal.	I. F. Module Section 4

(f) Test of R. F. Section

This test can only be carried out if the test of the I. F. proves successful.

Switch the R. F. -I. F. switch to RF1. A number of positive going (upwards) signals should be seen on the trace. These are the calibration signals from the receiver. This test checks the R. F. and I. F. sections.

A negative going (downwards) marker in the form of a square pulse should be observed under one of the calibration signals. This is a marker which moves as the KC dial on the receiver is moved and is called the receiver tuning marker. This test checks the marker circuits.

Adjust the R. F. CENTER control to move this marker to the center of the tube. The calibration signals will also move and should occupy the trace length. This should result in eleven signals being displayed between the engraved marks on the face of the screen. Note that eleven signals have a total of ten spaces between the first and last signals. Thus as the calibration signals are 100 KHz apart, the trace is 1000 KHz or 1 MHz wide.

Switch to RF2. The signals should become larger. This checks the part of the I.F. module not checked in the I.F. test.

(g) Fault Location on R.F. (covers may have to be removed)

Fault	Check
No calibration signals	Cables from receiver
No calibration signals	2(a) and 2(b)
No calibration signals	R.F. Module Section 7
Too few signals displayed	Calibration of R.F.
No tuning marker	Cables from receiver
No tuning marker	2(a) and 2(b)
No tuning marker	R.F. Module Section 7
No signals in RF2	I.F. Module Section 4

4. TROUBLE SHOOTING THE I.F. - Dwg. G-03007 or G-03009

The tests in this section are intended to enable any of the likely causes of failure to be found. If these checks do not help in finding the fault, and it has been determined that the I.F. is faulty, then the alignment procedure must be checked in order that the cause be found.

Remove the top cover from the Display and locate the I.F. and R.F. Module. Switch on and observe that the traces are operating.

Set the controls as follows:

IF Gain	Fully Clockwise
IF Sweep	Fully Clockwise
IF Center	Mid-Range
RF-IF Switch	IF

(a) Signal Test of the I.F.

Ensure that the cables from the IF Gain control are connected to J201 and J202 or J501 and J502 respectively. Connect a signal generator at 1.6 MHz, 1 mV to J203 or J503. If the module is operating correctly, a large signal should be seen on the trace.

5. I.F. AND DET BOARD, A501 - Dwg. G-02191

If no signal is seen remove the top cover from the module and make the following checks with no signal at J203 or J503.

Check Point	Result
Resistance from J504 to ground	100 ohm
D.C. voltage E1 to ground	-16V
D.C. voltage E7 to ground	-16V
D.C. voltage E12 to ground	-16V
D.C. voltage E15 to ground	+70V
R.F. voltage at E8	Greater than 100 mV and varying by a small amount.

Switch the RF-IF Switch to RF2.

Check Point	Result
Resistance from J504 to ground	1000 ohms
D.C. voltage E1 to ground	-16V
D.C. voltage E7 to ground	0V
D.C. voltage E12 to ground	0V
D.C. voltage E15 to ground	+70V
R.F. voltage at E8	Greater than 100 mV

Switch the RF-IF switch to RF1. The results are the same as above except that E12 should read -16V.

If the fault in the IF and DET board has not been located during these checks, then proceed to the alignment section in order to check the alignment, Chapter 9, Section 3 or 5.

6. I.F. SWEEP BOARD, A502, Dwg. G-02180

Remove the bottom cover of the R.F. and I.F. Module. This will expose the I.F. Sweep Board marked Series 700.

Set the controls as follows:

IF Gain	Fully Clockwise
IF Sweep	Fully Clockwise
IF Center	Mid-range
RF-IF Switch	I.F.

Make the following checks:

Check Point	Result
D.C. voltage E1 to ground	-16V
D.C. voltage E4 to ground	-8.5 varying
D.C. voltage E5 to ground	-8.5 varying
D.C. voltage E6 to ground	-8.5 varying
D.C. voltage E8 to ground	-16V
D.C. voltage E9 to ground	-9V varying
D.C. voltage E10 to ground	-4.5V
D.C. voltage E11 to ground	-2.5V (depends on IF center)
R.F. voltage E12 to ground	Greater than 100 mv, varying

Switch RF-IF switch to RF1 or RF2. The results should be the same as above except:

D.C. voltage E8 to ground	0V
R.F. voltage E12 to ground	Greater than 100 mv

If the faults in the I.F. Sweep Board has not been located during these tests, then proceed to the alignment procedure and check the

alignment, Chapter 9, Section 2 or 4.

7. TROUBLE SHOOTING THE R.F. - Dwg. G-03007 or G-03009

The tests in this section are intended to enable any of the likely causes of failure to be found. If these checks do not help in finding the fault, and it has been determined that the RF is faulty, then the alignment procedure must be checked in order that the cause be found.

Remove the top cover from the display and locate the RF and IF modules. Switch on the display and observe that the traces operate.

Set the controls as follows:

IF Gain	Fully Clockwise
RF-IF Switch	RF2
RF Sweep	Fully Clockwise
RF Center	Mid-range

In order to make sure that the I.F. is operating in the R.F. mode, the following test should be made.

Signal Test of I.F. in R.F. Mode

Connect a signal generator at 1.6 MHz, 1 mV to J203 or J503. Adjust the frequency slightly until the whole base line of the trace rises. If this happens, then the I.F. is working in the R.F. mode. If not, then trouble shoot the I.F. module.

8. SWEPT R.F. SECTION - Dwg. G-02312

Ensure that the cables from the I.F. Gain control are connected to J201 and J202 or J501 and J502. Remove the top cover of the R.F. and I.F. Module.

Connect a signal generator at 2.5 MHz, 100 uv to E602. If the module is operating correctly, a large signal should be seen on the trace.

If no signal is seen, make the following checks with no signal at E602.

Check Point	Result
D.C. voltage E1 to ground	-16V
D.C. voltage E4 to ground	-6V
D.C. voltage E5 to ground	-4V (depends on R.F. center)
D.C. voltage E6 to ground	-8V varying due to sweep voltage
R.F. voltage E9 to ground	200mV at 23 - 24 MHz
R.F. voltage E12 to ground	200mV at 19.4 MHz

If the fault has not been located during these checks then proceed to the alignment section for this board and check the alignment, Chapter 9, Section 6.

9. RECEIVER TUNING MARKER SECTION - Dwg. G-02314

Set the controls as follows:

Marker Switch	On
RF Sweep	Fully Clockwise
RF Center	Mid-Range
RF-IF Switch	RF2

Signal Check for Marker

Connect a signal generator at 4.1 MHz, 150 mV to J106 or J102. A negative pulse should appear near the center of the trace. If this does not happen, proceed with the following.

Remove the bottom cover from the R.F. and I.F. Module. This will expose the marker board which is marked Series 400.

Check Point	Result
D.C. voltage E1 to ground	-16V
D.C. voltage E7 to ground	-16V
R.F. voltage E2 to ground	150 mV at 4.1 MHz
Oscilloscope at E4 to ground	12V negative spike each 250 mSec.
R.F. voltage E6 to ground	200 mV at 19.4 MHz
Oscilloscope at E8 to ground	16V positive pulse each 250 mSec.
R.F. voltage E11 to ground	200 mV at 23-24 MHz

These tests should locate the general area of the fault. If the fault cannot be found after these tests are made, proceed to the alignment section for the Marker and check the alignment.

10. TROUBLE SHOOTING THE H.V.P.U., A4 - Dwg. G-02231

WARNING: This unit contains 2000 volts. Extreme care must be exercised in measuring voltages on this board.

It is recommended that the cover be replaced over this unit as soon as work is finished.

Trouble shooting is limited to a series of voltage checks. For all the voltages consult the alignment procedure.

Check Point	Result
D.C. voltage E6 ground (S101 in line)	-30V
D.C. voltage T.P.1 to ground	-16V
D.C. voltage T.P.2 to ground	-16V
D.C. voltage T.P.3 to ground	+300V
D.C. voltage T.P.4 to ground	+70V
D.C. voltage E18 to ground	-2000V

Use Dwg. G-03004 (Main Chassis)

Fault	Check
No -30V at E6	-16V unreg.
No -16V at T.P.1	R2, Q1 and Q101 or Q102
No -16V at T.P.2	L.V. Power Unit
No +300V at T.P.3	-16V at T.P.2, A105, VR2, VR3, VR4
No +70V at T.P.4	-16V at T.P.2, A105, VR2, VR3, VR4
No -2000V at E18	-16V at T.P.2, A105

Trouble Shooting A105 or A109

This is a DC to DC converter which should have the following pin voltages.

Pin	Voltages
1	-16V DC input
2	Ground
3	1.5V rms on -2000V DC
4	1.5V rms on -2000V DC
5	-2000V DC
6	Ground
7	+400V DC

This is a sealed unit and it is not possible to repair it. Ensure that none of the outputs are shorted to ground before replacing this unit as a cause of failure.

11. HORIZONTAL AND R.F. TIME BASE BOARDS, A3, Dwg. G-02216

Initial Checks

These checks are simple D.C. checks to find out quickly if any fault exists and can be made using a multimeter.

Check Point	Result
D.C. voltage E1 to ground	-16V
D.C. voltage E2 to ground	-16V
D.C. voltage E3 to ground	+300V
D.C. voltage E5 to ground	-8V varying

Check Point	Result
D.C. voltage E6 to ground	-8V varying
D.C. voltage E7 to ground	+150V varying

Failure to obtain any of these results will locate the fault to the appropriate circuit and reference should be made to the alignment procedure for more detailed information of voltage levels and waveforms.

12. TROUBLE SHOOTING THE MAIN CHASSIS, G-03004, Series 100

This section covers checks that may be made on the various front panel controls and the tube socket to determine if any fault condition exists.

(1) Tube

A fault condition in the CRT will normally be its failure to produce a trace. The simplest way to check the tube is to replace it with another. If this is not possible check that the following voltages are available at the tube socket. Proceed as follows:

(a) Switch off the display unit.

(b) Remove the top cover.

(c) Remove the bezel covering the tube face from the front panel.

(d) Disconnect the anode connector situated near the front of the tube.

(e) Remove the tube through the front panel, loosening the socket at the same time.

Check that the following voltages appear at the tube sockets. High voltages are present so care must be taken.

Socket Pin Number	Voltage
1	+150V - shifts with HORIZ control
2	+150V varying due to sweep
3	1.5V AC on -2000V
4	-2000V
5	-1500V - shifts with FOCUS control
6	+75V
7	+40V - shifts with VERT control
8	1.5V AC on -2000V

Failure to obtain any of the voltages above will indicate a reason for the fault on the tube. Reference should then be made to the Main Chassis schematic in order that the respective leads be traced out to determine the source of the missing voltage.

(2) Front Panel Controls

In order to simplify measurements, the voltages given for these controls will be those expected at the center connection of the control with the knob set at its mid position.

(a)

Control	Voltage at Center Arm
R.F. CENTER	-4V
R.F. SWEEP	-12V
INTENSITY	-2000V
FOCUS	-1800V
RF-IF SWITCH	-16V
VERT	+45V
HORIZ	+180V
I.F. CENTER	-2V
I.F. SWEEP	-13V
I.F. GAIN	0V

If any of these voltages do not appear use the Main Chassis schematic to trace the source of the voltage.

13. SYNCHRONIZATION

The effect of the trace not being in sync will be to cause a signal that is being displayed to drift across the screen.

The reason for this is that the sweep rates are not exactly set to 4 cycles per second.

This can be corrected by slightly adjusting the SWEEP RATE potentiometer while observing a signal. This assumes that the control is only slightly off adjustment and should not be attempted as an alignment procedure.

(a) Signal Drifts in IF

Adjust R5 on HORIZ and R.F. Time Base board until no drift is observed.

(b) Signal Drifts in RF1 and RF2

Adjust R23 on HORIZ and R.F. Time Base board until no drift is observed.

14. D.C. BALANCE

It is desirable when wishing to expand a signal using the SWEEP

if necessary, to give a signal less than full scale deflection.

(2) Turn the I.F. SWEEP counter-clockwise and observe the signal widen and move to one side of the trace. At this point bring the signal back to the center of the trace using R10, D.C. BAL.

(3) Turn the I.F. SWEEP fully clockwise and position the signal in the center of the trace using the I.F. CENTER.

Repeat c(2) and c(3) until the signal does not move from the center of the trace as the I.F. SWEEP control is adjusted.

15. LOW VOLTAGE POWER UNIT - Dwg. G-02945

The low voltage power unit produces a -16V regulated output which is used to supply the majority of the circuitry. A -16V unregulated voltage is also generated to drive the high voltage power units. This voltage is approximately -30V once the ripple on it is smoothed out.

The A.C. input can be 115V or 230V, 45 Hz to 400 Hz. This voltage is selected by a switch at the rear. Check that this switch is in the desired position before switching the equipment on.

Check that the fuses are the correct values and are not in the wrong holders.

The -16V regulated is adjusted by R7. A hole is provided at the rear for this purpose.

Voltage Checks

In order to make voltage checks on the power unit the cover has to be removed. The fixing screws are located underneath the chassis (2) and on top of the cover (2). The cover may then be lifted off.

Make the following voltage checks on the unit.

Voltage Check	Value
E1 to E2	115V AC or 230 V AC
E11 to ground	-32V
E15 to ground	-20V to -35V
E3 to ground	-28V
E6 to ground	-16V
Junction of R10 and VR1	-7.5V

A measurement of these voltages should locate the area of the fault and standard procedures should then be used to find the fault.

WIDTH controls that the signal remains in the center of the trace.

If this does not happen then it may be possible to correct this using the front panel controls. Due to the overlap of the trace the HORIZ control may be shifted from the position it was in during alignment. Thus, the signals on the trace would also move. To correct for this the R.F. CENTER and I.F. CENTER controls would have to be reset to center signals on the trace. The D.C. balance setting would then be upset.

After the HORIZ and R.F. CENTER controls have been adjusted and the R.F. SWEEP control expands a signal in the center of the trace, it should be possible to switch to the I.F. position of the RF-IF switch and expand a signal in the center of the trace without it moving off the screen.

(a) Setting D.C. Balance

When correction of a D.C. balance problem cannot be made using the front panel controls, then adjustment of the appropriate D.C. balance pots must be made.

(b) R.F. D.C. Balance, Dwg. G-02216

(1) Switch to RF1 and display a signal in the center of the trace using the calibration markers from the receiver as described in Section 3, Fault Location Using RA.6217 Calibrator. Adjust the I.F. GAIN, if necessary, to give a signal less than full scale deflection.

(2) Turn the R.F. SWEEP counter-clockwise and observe the signal widen and move to one side of the trace. At this point bring the signal back to the center of the trace using R29, D.C. BAL.

(3) Turn the R.F. SWEEP fully clockwise and position the signal in the center of the trace using the R.F. Center.

Repeat b(2) and b(3) until the signal does not move from the center of the trace as the R.F. SWEEP control is adjusted.

(c) I.F. D.C. Balance, Dwg. G-02180

(1) Switch to I.F. and display a signal in the center of the trace using the calibration markers from the receiver as described in Section 3, Fault Location Using the RA.6217 Calibrator. Adjust the I.F. GAIN,

CHAPTER 8

ALIGNMENT PROCEDURE

SECTION

1. HIGH VOLTAGE POWER UNIT
2. SAWTOOTH GENERATORS
3. IF AND DET. (455 KHz SECTION)
4. 1.145 MHz OSCILLATOR
5. IF AND DET. (1.6 MHz SECTION)
6. SWEPT RF STAGES
7. MARKER
8. CALIBRATION OF IF AND RF DISPLAY
9. LOW VOLTAGE POWER UNIT

General Information

All other possible sources of trouble should be eliminated before any alignment is undertaken. The alignment procedures may be used to trace a fault, but in doing so do not actually make the adjustments; merely establish that they are correct.

If any adjustments are deemed necessary, only a small angular adjustment of any control should be made.

Sections 1 through 8 apply to each channel of the Spectrum Display Unit, as identical circuits are used. Thus, the alignment procedures will be used twice, once for each channel.

Section 9 is used once as this is the common power source for each channel.

Reference is made to a Master and Slave channel. The Master is on the left hand side of the unit.

Chapter 8

ERRATA to the RA. 6367 DISPLAY UNIT

ALIGNMENT PROCEDURE

1) Adjustment of Crystal Oscillators:

a) Some trouble has been experienced with failure of crystal oscillators to start under some environmental conditions. The following alignment procedures are to be carried out during alignment of these oscillators.

19.4 MHz Oscillators

Adjustment of L4: Tune core clockwise towards the bottom of the coil until the oscillator just ceases to function. Tune core anti-clockwise from this point by one full turn to ensure stable operation.

1.145 MHz Crystal Oscillator

Adjustment of R11: Care must be taken to ensure that R11 is set to the center of the range of adjustment over which the oscillator continues to function.

1. POWER UNIT - Dwg. G-02231

WARNING: This unit contains 2000 V. Care must be taken when measuring voltages or making adjustments inside this unit.

No adjustments are necessary if the unit is used on BATTERY.

Remove the top cover and locate TP1. Connect a DC meter from TP1 to ground.

Adjust R2 until the voltage at TP1 is -16V.

Check that the voltage at E19 is +300V and at E10 is +70V.

Replace the top cover.

2. SAWTOOTH GENERATORS

The master sawtooth generator is located on the IF SWEEP board. It is called the nonlinear sawtooth generator and is free running device. Its sweep rate is adjusted to occur four times each second. Triggering pulses are taken from this generator to sync the Horizontal and RF Sawtooth Generators on the Master channel and the I. F. Horizontal and R. F. Sawtooth generators on the Slave channel.

a. I. F. Sawtooth Generator - Dwg. G-02180

Connect an oscilloscope, set to a 50 mSec/cm sweep, on the DC input, to E6. Adjust R5 to produce a sweep rate of 4 cycles per second and R6 for the best linearity. This should result in a sawtooth waveform being produced.

Use the vertical control on the oscilloscope to place the sawtooth centrally about the middle of the screen.

Rotate the IF SWEEP control on the front panel to reduce the sawtooth from its maximum to its minimum.

If the sawtooth moves from the center, adjust R10 to tend to correct the shift.

Continue adjusting the IF SWEEP and the DC BAL. until it is possible to increase and decrease the size of the sawtooth about the center line of the oscilloscope.

The amplitude of the sawtooth waveform should be approximately 4V peak to peak.

b. Horizontal Sawtooth Generator - Dwg. G-02216

Connect an oscilloscope, set to a 50 mSec/cm sweep, on D.C. input, to TP1. Adjust R7 to produce a sweep

rate of 4 cycles per second and R8 for the best linearity. This should result in a sawtooth waveform being produced. The sawtooth waveform should now be triggered by the input at E2.

Use the vertical control on the oscilloscope to place the sawtooth centrally about the middle of the screen.

Rotate R12 from one end of its travel to the other to reduce the sawtooth from its maximum to its minimum.

If the sawtooth moves from the center adjust R13 to tend to correct the shift.

Continue adjusting the SWEEP WIDTH and DC BAL. pots until it is possible to increase and decrease the size of the sawtooth about the center line of the oscilloscope.

The amplitude of the sawtooth should be approximately 6V peak to peak at the maximum setting of R12.

With R12 set at maximum and the oscilloscope at E7 (set for 300V input) a waveform limited at top and bottom should be observed.

Adjust R15 until no limiting occurs.

A full trace should now be seen on the tube which can be centered using the HORIZ. control.

c. RF Sawtooth Generator - Dwg. G-02216

The RF sawtooth generator is triggered by pulses from the horizontal sawtooth generator. These pulses occur four times each second.

Connect an oscilloscope, set to a 50 mSec/cm sweep, on DC input, to E6. Adjust R23 to produce a sweep rate of 4 cycles per second and R24 for the best linearity. A sawtooth waveform should now be produced. The sawtooth waveform should now be synchronized to the IF sawtooth generator.

Use the vertical control on the oscilloscope to place the sawtooth centrally about the middle of the screen.

Rotate the RF SWEEP control on the front panel from one end to the other to reduce the sawtooth from its maximum to its minimum.

If the sawtooth moves from the center, adjust R29 to tend to correct the shift.

Continue adjusting the RF SWEEP and DC BAL. pots until it is possible to increase and decrease the size of the sawtooth about the center line of the oscilloscope.

The amplitude of the sawtooth should be approximately 0.5V peak to peak at the maximum setting of the RF SWEEP.

3. IF AND DET (455 KHz SECTION) - Dwg. G-02191

In order to simplify alignment of this board the trace on the tube is used as a measuring instrument. Signals fed into the IF at various points will cause the whole base line of the trace to rise.

It is recommended that the output lead from the signal generator be fed through a capacitor, which has a small connecting clip attached to one end. This is to enable signals to be fed into resistors on the P.C. board.

a. Vertical Amp. and Det

Switch the RF/IF switch to IF. Turn R39 and R35 to their maximum positions which is fully clockwise.

Connect a signal generator via a 0.1 uf capacitor to the junction of CR1 and CR2. Adjust the signal generator output to 455 KHz at 1 volt. The trace should rise from the base line. Adjust the signal generator output to place the trace on the second top engraved mark on the screen. This is the reference output. Note the signal generator output. It should be approximately 1 volt.

b. 2nd IF Amplifier

Connect the signal generator output via a 0.1 uf capacitor to the junction of R31 and R32 at 455 KHz.

Adjust the cores in T2 and T3 for a maximum deflection of the base line. Reduce the input until the base line is at the reference point. Note the signal generator output. It should be approximately 15 mv. The gain of the 2nd IF amplifier is therefore 36 db.

c. 1st IF Amplifier

Connect the signal generator output via a 0.1 uf capacitor to the junction of R20 and R21 at 455 KHz. Ensure that the RF/IF switch is set to IF. Turn R22 to its maximum gain position which is fully clockwise.

Adjust the signal generator frequency to exactly 455 KHz. This is necessary because the signal is now passing through the narrow filter, FL1.

Reduce the signal generator input until the reference is reached on the trace. The generator output should be approximately 3 mV.

Switch the RF/IF switch to RF2. Adjust the core in L3 for a maximum on the trace. The generator output reading should be approximately 3 mV.

The gain of the 1st IF amplifier is therefore 15 db.

d. Mixer

Connect the signal generator output via a 0.1 uf capacitor to the junction of R13 and R14 at 455 KHz.

Adjust the core in T1 to produce a maximum deflection of the base line of the trace.

Reduce the signal generator output until the reference point on the screen is reached. The signal generator output should be approximately 0.3 mV.

It is now necessary to align the 1.145 MHz oscillator. In the IF position of the RF/IF switch the oscillator is swept by the IF sawtooth generator. In the RF position of the RF/IF switch the oscillator is crystal controlled.

4. 1.145 MHz OSCILLATOR - Dwg. G-02180

The alignment of this oscillator is a continuation of the alignment of the IF and detector section.

Set the front panel controls as follows:

RF-IF SWITCH	IF
IF SWEEP	Fully Clockwise
IF CENTER	Mid-range

Connect a signal generator via a 0.1 uf capacitor to the junction of R13 and R14 on the IF and DET board. Set the generator frequency to exactly 1.6 MHz at an input level of 1 mV.

Adjust the core in A1 until a full scale signal appears on the trace. Position the core so that the signal is placed in the center of the trace.

Change the signal generator frequency until the signal is placed at the right hand side of the trace. Note this frequency. Change the frequency to place the signal at the left hand side of the trace. Note this frequency. The difference between the two frequency readings should be greater than 75 KHz. The gain of this stage is 10 db.

NOTE: If this reading is less than 75 KHz, then the most likely cause is that the horizontal sweep is too great. This can be checked

by observing the amount of overlap of the trace using the HORIZ. control. One quarter of an inch at each end is normal. If necessary, adjust R12 SWEEP WIDTH on the Horizontal and RF time base board to achieve this.

Return the signal to the center of the trace.

Switch the RF/IF switch to RF2 and adjust R11 slowly until the trace rises. Continued adjustment will cause the trace to fall. Leave the control set in the center of the region necessary to produce trace base line deflection.

The RF voltage at E12 should be approximately 100 mV. The gain of the mixer is therefore 10 db.

5. IF AND DET (1.6 MHz SECTION) - Dwg. G-02191

a. 1.6 Mc BPF

Switch the RF/IF switch to IF and turn the IF gain control fully clockwise.

Connect a signal generator to J101 with an input level of 30 mV. Set the output frequency to 1.6 MHz. Connect an RF voltmeter to the junction of R10 and R11.

Adjust L1 and L2 for a maximum output on the meter.

Change the generator frequency to 1.51 MHz. Adjust A1 for a minimum deflection.

Change the generator frequency to 1.69 MHz. Adjust A2 for a minimum deflection.

It may be necessary to repeat the procedure in order to obtain a 75 KHz bandwidth with a ripple of approximately 3 db.

An input of 10 mV at J101 should produce 30 mV at the junction of R10 and R11. The gain of the amplifier is therefore 10 db.

6. SWEPT RF STAGES - Dwg. G-02312

The most satisfactory way of aligning this board is to use the deflection of the base line of the trace as a measuring instrument. This is similar to the method used in aligning the IF and DET section. It is necessary that the IF section be aligned prior to the RF section.

Switch the RF/IF switch to RF2. Turn the IF GAIN fully clockwise.

Connect a signal generator via a 0.1 uf capacitor to E10 at 1.6 MHz. Adjust the output level to place the base line at the second top engraved line on the screen. This will be used as a reference output. The signal generator should read approximately 40 microvolts.

a. Mixer 2

Connect the signal generator via a 0.1 uf capacitor to the junction of R31 and R32 at 1.6 MHz. Adjust the core in A8 for a maximum deflection on the trace.

Change the generator frequency to 21 MHz. Adjust the core in L4 to make the base line rise. There is a wide range for this core so it may already be tuned. The optimum position for this slug has been found to be towards the bottom of the coil at the point just before the oscillator ceases to function.

The level of 19.4 MHz should be approximately 50 mV at the junction of R37 and C35, and 150 mV at E12.

The signal generator output should be 40 microvolts to produce the reference output on the trace. There is unity gain over this stage.

b. Mixer 1

Connect a signal generator, via a 0.1 uf, to the junction of R23 and R24 at 21 MHz.

Adjust C24 and C31 to produce a maximum deflection of the base line. The signal generator output should be approximately 40 microvolts to produce the reference output on the trace. There is unity gain over this stage.

c. 2 - 3 MHz BPF

Connect a signal generator to J201 2 - 3 MHz. Connect an RF voltmeter to the junction of R22 and C23. Adjust the output of the generator at 2.5 MHz to produce 100 mV on the RF voltmeter. The signal generator should read approximately 50 mV.

Adjust the cores as follows:

A1 for a maximum at 2.5 MHz
A7 for a maximum at 2.5 MHz
A4 for a maximum at 2.1 MHz
A2 for a minimum at 3.66 MHz
A3 for a minimum at 1.63 MHz
A5 for a minimum at 4.5 MHz
A6 for a minimum at 1.3 MHz

NOTE: Alignment of this filter is made more difficult due to the 23 - 24 MHz sweep oscillator causing some deflection on the RF voltmeter. This can be lessened by turning the RF SWEEP control fully counter-clockwise.

Repeat the adjustment of the cores until the filter has a ripple of approximately 3 db between 2 and 3 MHz.

The signal generator indicated output should be approximately 15 mV for 30 mV at the junction of R22 and C23 at 2.5 MHz. There is a 2 db gain over this stage.

d. 23 - 24 MHz Sweep Oscillator

Connect a DC meter to E5. Adjust the RF CENTER control until the meter reads -4V.

Connect a signal generator to J201, 2 - 3 Mc at 2.5 MHz, 100 uV.

Set the controls as follows:

RF SWEEP	Fully Clockwise
RF/IF SWITCH	RF2
IF GAIN	Fully Clockwise

Adjust the core in L2 to place the signal from the signal generator in the center of the screen.

NOTE: A more satisfactory way of adjusting L2 is to use the calibration signals from the receiver. The group of eleven signals is much easier to observe between the spurious that are created when L2 is off tune.

The signal generator output at 2.5 MHz with 30 uV indicated should produce a signal on the trace at least one quarter of an inch high.

Change the signal generator frequency to 3 MHz. The signal should be at the left hand side of the trace.

Change the signal generator frequency to 2 MHz. The signal should be at the right hand side of the trace.

It is possible to widen or narrow the bandwidth of the trace in RF by shifting the position of the core in L2. Each time L2 is shifted, bring the signal at 2.5 MHz back to the center using the RF CENTER control. Continue until the bandwidth is the desired 1 MHz wide.

Check that the output at E9 is approximately 200 mV and approximately 60 mV at the junction of R18 and C27.

7. MARKER - Dwg. G-02314

a. 4.6 MHz LPF

Connect a signal generator to J202 2nd VFO. Connect an RF voltmeter to the junction of R17 and R14.

Switch the MARKER to ON and the RF/IF switch to RF2.

Set the generator frequency to 4.6 MHz at 100 mV. Adjust the cores in A1 and A2 for a maximum deflection on the meter.

The reading on the RF voltmeter should be approximately 70 mV at 4.6 MHz.

Ensure that the filter passes frequencies from 3.6 MHz to 4.6 MHz and rejects frequencies above 6 MHz.

b. Mixer 1

Alignment of the transformers in the output of this mixer is made very difficult by break-through of the 23 - 24 MHz sweep. It is possible, however, to align the coils by switching the MARKER switch to OFF.

Switch the MARKER switch OFF. Connect a signal generator, via a 0.1 uf capacitor to the junction of R17 and R14. Connect an RF voltmeter to the junction of R15 and R13.

Set the generator frequency to 19.5 MHz, 20 mV indicated. Adjust the cores in T1 and T2 for a maximum indication on the RF meter. The reading on the meter should be approximately 70 mV.

NOTE: The passband of this IF allows unwanted pulses from the blanking circuitry through it if it is aligned exactly to 19.4 MHz. To help to eliminate this the wanted 19.4 MHz is placed at the lower edge of the passband.

Connect an oscilloscope to the junction of R17 and R14. Set the sweep to 50 mSec/cm and observe a 12 volt negative blanking pulse each 250 mSec.

Switch the MARKER to ON and the RF/IF switch to RF2.

Connect a signal generator to J202 2nd VFO at 4.1 MHz, 150 mV indicated. A marker pulse in the form of a negative square wave should appear on the trace with the RF SWEEP fully clockwise. Use the RF CENTER to place the marker in the center of the trace.

Change the frequency to 3.6 MHz. The marker should move to the right hand edge of the trace.

Change the frequency to 4.6 MHz. The marker should move to the left hand edge of the trace.

Set the frequency back to 4.1 MHz. Turn the RF SWEEP control fully counter-clockwise.

Change the frequency to shift the marker from one edge of the trace to the other. A shift of approximately 100 KHz should cause this escursion.

NOTE: It may be necessary to slightly adjust the cores in T1 and T2 to achieve a marker which is unaffected by the blanking pulse spurious. The cores should not have to be shifted more than half a turn from those positions set using the signal generator.

8. CALIBRATION OF IF AND RF DISPLAY

After alignment of all the circuitry it still may be necessary to adjust the linearity of the displayed signals. It is also necessary that a full check of the operation of the display unit with the receiver be made.

Connect the coaxial cables between the receiver and the display unit as follows:

	Receiver	Display Unit
a.	2 - 8 Mc OUT	2 - 3 Mc IN
b.	2nd VFO OUT	2nd VFO IN
c.	1.6 Mc OUT	1.6 Mc NARROW
d.	1.6 Mc WIDE	1.6 Mc WIDE

NOTE: The cables indicated in c. and d. should not be connected at the same time unless a switch is used which will select one or the other.

a. Calibration of IF

Switch the receiver to CAL and the RF GAIN fully clockwise. Set the KC dial to 500.

Adjust the controls on the display unit as follows:

RF/IF SWITCH	IF
IF GAIN	Fully Clockwise
IF SWEEP	Fully Clockwise
IF CENTER	Mid-position

A large signal should appear on the trace. Turn the KC dial on the receiver slowly. The large signal should diverge into three signals, one fixed, the other two moving away from the fixed one.

Place the fixed signal in the center of the trace using the IF CENTER control. Continue turning the KC dial until one of the signals is at the edge of the screen. The other signals should be at the other edge.

If the two signals are not equally spaced about the center, then adjust R6 LINEARITY on the IF board to correct the error.

The center will probably shift but this can be corrected using the IF CENTER.

Note the frequency of the KC dial, which sets the two signals at the edge of the trace. This should be greater than 37.5 KHz showing that the total bandwidth is greater than 75 KHz.

With the fixed signal in the center of the trace, turn the IF SWEEP control counter-clockwise. The signal should expand, but not move from the center of the trace. If it does move, bring it back using R10, the DC BAL. pot on the IF sweep board. Keep adjusting the DC BAL. and IF CENTER until the signal will expand without moving from the center of the trace.

b. Calibration of RF

Switch the receiver to CAL and the RF GAIN fully clockwise. Set the KC dial to 500.

Adjust the controls on the display unit as follows:

RF/IF SWITCH	RF2
IF GAIN	Fully Clockwise
RF SWEEP	Fully Clockwise
RF CENTER	Mid-range
MARKER	ON

The trace should be filled with calibration signals all equally spaced apart. Place the one which has the receiver tuning marker under it at the center of the trace.

There should be a minimum of eleven markers on the trace, each 100 KHz apart. If the spacing between the markers is not equal then adjust R24 LINEARITY on the Horizontal and RF time base board to make the spacing equal.

Turn the RF SWEEP pot counter-clockwise to expand the signal at the center of the trace. The signal should not move from the center of the trace. If it does move, bring it back using R29 DC BAL. on the Horizontal and RF time base board. Keep adjusting the DC BAL. and RF CENTER until the signal will expand without moving from the center of the trace.

With the signal fully expanded, switch the RF/IF switch to RF1. The signal should now be narrow and be in the center of the trace. If it is not in the center of the trace, use the RF CENTER to place it there. Switch to RF2 and adjust L3 on the IF and DET board to place it in the center of the trace.

9. LOW VOLTAGE POWER UNIT - Dwg. G-02945

Remove the top cover from the Power Unit. Connect a D.C. meter to E6. Adjust R7 until the voltage is -16V. Check that the voltage at E15 is between -20 and -35 volts. This is an unregulated voltage and its value depends on the line voltage.

CHAPTER 9

Parts Lists and Schematic Diagrams, RA.6367

Series No.	Description	Drawing No.	Parts List
100	Main Chassis	G-03004D	A03020B
200	Master RF and IF Module (L.H.)	G-03007C	A03022B
300	Swept RF Stages	G-02312D	A02313G
400	Marker	G-02314H	A02316J
500	Slave RF and IF Module (R.H.)	G-03009C	A03022B
600	IF and Detector	G-02191C	A02168F
700	IF Sweep	G-02180A	A02147D
800	Horizontal and RF Time Bases	G-02216D	A02233B
900	Power Unit	G-02231D	A02243D
1300	Power Unit	G-02945A	A02923C

ORDERS FOR SPARE PARTS

When ordering spare parts, it is recommended that users include the following information:

(1) Type and serial number of equipment.

(2) Circuit reference, description, and manufacturer of part required.

(3) Quantity required.

PARTS LIST ERRATA

The following assemblies - listed by drawing number - may be obtained as complete assemblies from Racal Communications, Inc. These are printed-circuit assemblies and may be preferred for field maintenance purposes over repair and replacement of individual components. When ordering any of the assemblies listed, please supply assembly description and drawing number.

Serial Number	Description	Dwg. Number
300	Swept RF Stages	G-02312
400	Marker	G-02314
600	IF and Detector	G-02191
700	IF Sweep	G-02180
800	Horiz. and RF Time Bases	G-02216
900	Power Supply Board	G-02231

RA. 6367

PARTS LIST - RA.6367

MAIN CHASSIS - Series 100 - Dwg. G-03004

RESISTORS:

Ckt. Ref.	Description	Value Ohms	Tol. ±%	Rating Watts	Mfr. Part No. or Mil Type Desig.
R101	Fixed Composition	75	5	1/4	RC07GF750J
R102	Fixed Composition	10K	5	1/4	RC07GF103J
R103	Fixed Composition	18K	5	1/4	RCI #10693
R104	Potentiometer	1K (IF Gain)			RCI #B-02337
R105	Potentiometer	1K (RF Center)			RCI #B-02336
R106	Fixed Composition	620	5	1/4	RC07GF621J
R107	Potentiometer	50K (IF Sweepwidth)			RCI #B-02334
R108	Potentiometer	1K (IF Center)			RCI #B-02334
R109	Potentiometer	500K (Intensity)			RCI #B-02332
R110	Fixed Composition	330K	5	1/4	RC07GF334J
R111	Fixed Composition	1.5M	5	1/4	RC07GF155J
R112	Potentiometer	10K (RF Sweep)			RCI #B-02335
R113	Potentiometer	1M (Focus)			RCI #B-02333
R114	Fixed Composition	220K	5	1/4	RC07GF224J
R115	Potentiometer	250K (Horizontal Position)			RCI #B-02338
R116	Fixed Composition	47K	5	1/4	RC07GF473J
R117	Potentiometer (dual with R115)	1M (Vertical Position)			RCI #B-02338
R118	Same as R101				
R119	Same as R102				
R120	Same as R104				
R121	Same as R105				
R122	Same as R106				
R123	Same as R107				
R124	Same as R108				
R125	Same as R109				
R126	Same as R110				
R127	Same as R111				
R128	Same as R112				
R129	Same as R113				
R130	Same as R114				
R131	Same as R115				
R132	Same as R116				
R133	Same as R117				
R134	Same as R103				

CAPACITORS:

Ckt. Ref.	Description	Value	Tol. ±%	Rating Volts	Mfr. Part No. or Mil Type Desig.
C101	Electrolytic	100uf	20	25	Sprague TE-1211
C102	Same as C101				
C103	Electrolytic	500uf	-10 +75	50	Sprague 39D507G050GL4
C104	Same as C103				

Main Chassis - Series 100 - Dwg. G-03004 - Cont'd.

CAPACITORS:

Ckt. Ref.	Description	Value	Tol. ±%	Rating Volts	Mfr. Part No. or Mil Type Desig.
C105	Same as C101				
C106	Same as C101				
C107	Same as C103				
C108	Same as C103				

TUBE & SOCKET:

Ckt. Ref.	Description	Mfr. Part No. or Mil Type Desig.
V101	Cathode Ray Tube	Sylvania 3BGP7
V102	Same as V101	
XV101	Pre-wired Octal Socket	Sylvania 8000-7033
XV102	Same as XV101	

TRANSISTORS:

Q101	2N3614 - Germanium, PNP	Motorola - RCI 30751
Q102	Same as Q101	

TRANSFORMER:

A109	Power Transformer	Venus Scientific Model 3R02

SWITCHES:

S101	DPDT Toggle switch (Marker, L.H.)	Arrowhart TS-3M
S102	Power ON/OFF, part of R109	B-02332
S103	Rotary, 3 position (RF/IF Selector)	B-02542-1
S104	Same as S101 (Marker, R.H.)	
S105	Same as S102 (part of R125)	
S106	Same as S103	

TERMINAL STRIPS:

TB101	12 position	RCI B-03015
TB102	Same as TB101	

CONNECTORS:

J101	(2 - 4 mc, R.H.)	UG1094/U
J102	(2nd VFO, R.H.)	"
J103	(1.6 mc WIDE, R.H.)	"

Main Chassis - Series 100 - Dwg. G-03004 - Cont'd.

CONNECTORS:

Ckt. Ref.	Description	Mfr. Part No. or Mil Type Desig.
J104	Coaxial (1.6 mc, R.H.)	UG1094/U
J105	Coaxial (2 - 3 mc, L.H.) Part of W4	"
J106	Coaxial (2nd VFO, L.H.) Part of W5	"
J107	Coaxial (1.6 mc WIDE, L.H.)	"
J108	Coaxial (1.6 mc, L.H.)	"
P101	Plug 25 contacts	Cannon DBM-25S
P102	Same as P101	
P103	Part of W106 (L.H. Unit)	
P104	Coaxial Plug (L.H. Unit)	Micon 1002/196
P105	Same as P104	
P106	Coaxial Plug (R.H. Unit) Part of W103	
P107	Coaxial Plug (R.H. Unit) - Same as P104	
P108	Same as P104	
P109	Plug 15 contact (Power Supply)	Cannon DAM-15P

CABLE ASSEMBLIES:

W 101	Cable Assy.	RCI D02509-32
W 102	Cable Assy.	RCI D02509-34
W 103	Cable Assy.	RCI D02509-29
W 104	Cable Assy., Same as W101	
W 105	Cable Assy.	RCI D02509-35
W 106	Cable Assy., Same as W103	

PARTS LIST - RA. 6367

R.F. & I.F. MODULE (L.H.) - Series 200 - Dwg. G-03007

NOTE: Assembly A03022 may be obtained as a complete module for spares purposes.

CONNECTORS:

Ckt. Ref.	Description	Mfr. Part No. or Mil Type Desig.
J201	Coaxial (I.F. Gain)	Micon 1003
J202	Same as J201	
J203	Same as J201	
J204	Module Connector, 25 Contacts	Cannon DBM-25P

CAPACITORS:

Ckt. Ref.	Description	Value	Tol. ±%	Rating Volts	Mfr. Part No. or Mil Type Desig.
C201	Electrolytic	500uf	-10 +75	50	Sprague 39D507G050GL4
C202	Ceramic Disc	0.1uf	20	25	Sprague 5C7
C203	Electrolytic	20uf		450	Sprague 39D206F450GL4

P.C. ASSEMBLIES:

Ckt. Ref.	Description	Mfr. Part No. or Mil Type Desig.
A201	IF & DET	RCI A02168
A202	IF Sweep	RCI A02147
A203	Swept RF Stages	RCI A02313
A204	Marker	RCI A02316

Swept R. F. Stages - Series 300 - Dwg. G-02312 - Cont'd.

INDUCTORS:

Ckt. Ref.	Description	Value	Mfr. Part No. or Mil Type Desig.
L1	RF Choke	33uhy	Nytronics Deciductor
L2	RF Choke Assy.		RCI D-02359
L3	RF Choke	10uhy	Nytronics Deciductor
L4	RF Choke Assy.		RCI D-02360

FILTER ASSEMBLIES:

Ckt. Ref.	Description	Mfr. Part No. or Mil Type Desig.
A1	2 - 3 mc Filter	RCI D-02363
A2	2 - 3 mc Filter	RCI D-02364
A3	2 - 3 mc Filter	RCI D-02365
A4	2 - 3 mc Filter	RCI D-02366
A5	2 - 3 mc Filter	RCI D-02367
A6	2 - 3 mc Filter	RCI D-02368
A7	2 - 3 mc Filter	RCI D-02369
A8	2nd Mixer	RCI D-02370

DIODE:

VR1	1N964B, Zener Diode	RCI 33520

TRANSISTORS:

Q1	2N3283, Germanium PNP	RCI 30500
Q2	ST8230, Silicon, PNP	Transitron RCI 31501
Q3	Same as Q2	
Q4	2N2996, Germanium PNP	T.I. RCI 30252
Q5	2N3323	RCI 30251
Q6	Same as Q5	

MISCELLANEOUS:

CR1	Varicap V-33 33 pf	Pacific Semiconductor
Y1	Crystal 19.4 mc	CR67/U RCI 37001
T1	RF Transformer	RCI D-02361
T2	Same as T1	

PARTS LIST - RA.6367

SWEPT R.F. STAGES - Series 300 - Dwg. G-02312

RESISTORS:

Ckt. Ref.	Description	Value Ohms	Tol. ±%	Rating Watts	Mfr. Part No. or Mil Type Desig.
R1	Fixed Composition	10	5	1/4	RC07GF100J
R2	Fixed Composition	330	5	1/4	RC07GF331J
R3	Fixed Composition	330	5	1/4	RC07GF331J
R4	Fixed Composition	6.8K	5	1/4	RC07GF682J
R5	Fixed Composition	3.9K	5	1/4	RC07GF392J
R6	Fixed Composition	12K	5	1/4	RC07GF123J
R7	Fixed Composition	10K	5	1/4	RC07GF103J
R8	Fixed Composition	1.2K	5	1/4	RC07GF122J
R9	Fixed Composition	1K	5	1/4	RC07GF102J
R10	Fixed Composition	68	5	1/4	RC07GF680J
R11	Fixed Composition	1K	5	1/4	RC07GF102J
R12	Fixed Composition	1.8K	5	1/4	RC07GF182J
R13	Fixed Composition	4.7K	5	1/4	RC07GF472J
R14	Fixed Composition	1.5K	5	1/4	RC07GF152J
R15	Fixed Composition	220	5	1/4	RC07GF221J
R16	Fixed Composition	150K	5	1/4	RC07GF154J
R17	Fixed Composition	100K	5	1/4	RC07GF104J
R18	Fixed Composition	470	5	1/4	RC07GF471J
R19	Fixed Composition	330	5	1/4	RC07GF331J
R20	Fixed Composition	2.2K	5	1/4	RC07GF222J
R21	Fixed Composition	330	5	1/4	RC07GF331J
R22	Fixed Composition	39	5	1/4	RC07GF390J
R23	Fixed Composition	10K	5	1/4	RC07GF103J
R24	Fixed Composition	3.9K	5	1/4	RC07GF392J
R25	Fixed Composition	47	5	1/4	RC07GF470J
R26	Fixed Composition	3.3K	5	1/4	RC07GF332J
R27	Fixed Composition	330	5	1/4	RC07GF331J
R28	Fixed Composition	18K	5	1/4	RC07GF183J
R29	Fixed Composition	3.3K	5	1/4	RC07GF332J
R30	Fixed Composition	330	5	1/4	RC07GF331J
R31	Fixed Composition	10K	5	1/4	RC07GF103J
R32	Fixed Composition	3.9K	5	1/4	RC07GF392J
R33	Fixed Composition	1K	5	1/4	RC07GF102J
R34	Fixed Composition	10K	5	1/4	RC07GF103J
R35	Fixed Composition	47	5	1/4	RC07GF470J
R36	Fixed Composition	3.3K	5	1/4	RC07GF332J
R37	Fixed Composition	330	5	1/4	RC07GF331J
R38	Fixed Composition	47	5	1/4	RC07GF470J

CAPACITORS:

Ckt. Ref.	Description	Value	Tol. ±%	Rating Volts	Mfr. Part No. or Mil Type Desig.
C1	Ceramic disc	.1uf	20	25	Sprague Monolythic 5C7
C2	Mica	82pf	1	300	CD6F82G300
C3	Electrolytic	25uf	25	25	Sprague TE-1207
C4	Same as C2				
C5	Same as C1				
C6	Not Assigned				
C7	Same as C1				
C8	Same as C1				
C9	Same as C1				
C10	Mica	470pf	5	100	CD7F471G100
C11	Same as C1				
C12	Same as C1				
C13	Ceramic disc	.001uf	10	500	Centralab CE-102
C14	Mica	220pf	2	300	CD7F221G300
C15	Same as C1				
C16	Same as C1				
C17	Same as C1				
C18	Mica	10pf	1	500	CD6C100J500
C19	Same as C1				
C20	Same as C1				
C21	Same as C1				
C22	Same as C1				
C23	Same as C1				
C24	Variable	7-35pf			RCI 28021
C25	Mica	68pf	1	500	CD6C680G500
C26	Same as C1				
C27	Same as C1				
C28	Same as C2				
C29	Mica	680pf	2	100	CD7F681G100
C30	Same as C1				
C31	Same as C24				
C32	Same as C1				
C33	Same as C1				
C34	Same as C1				
C35	Same as C1				
C36	Mica	100pf	1	300	CD6F101G300
C37	Same as C29				
C38	Same as C25				
C39	Same as C1				

PARTS LIST - RA.6367

MARKER - Series 400 - Dwg. G-02314

RESISTORS:

Ckt. Ref.	Description	Value Ohms	Tol. ±%	Rating Watts	Mfr. Part No. or Mil Type Desig.
R1	Fixed Composition	330	5	1/4	RC07GF331J
R2	Fixed Composition	100	5	1/4	RC07GF101J
R3	Fixed Composition	39K	5	1/4	RC07GF393J
R4	Fixed Composition	10K	5	1/4	RC07GF103J
R5	Same as R4				
R6	Same as R4				
R7	Fixed Composition	180K	5	1/4	RC07GF184J
R8	Same as R4				
R9	Fixed Composition	47K	5	1/4	RC07GF473J
R10	Fixed Composition	3.9K	5	1/4	RC07GF392J
R11	Fixed Composition	270	5	1/4	RC07GF271J
R12	Not Used				
R13	Same as R10				
R14	Same as R10				
R15	Fixed Composition	82K	5	1/4	RC07GF823J
R16	Same as R1				
R17	Same as R4				
R18	Same as R4				
R19	Fixed Composition	47	5	1/4	RC07GF470J
R20	Fixed Composition	820	5	1/4	RC07GF821J
R21	Fixed Composition	68	5	1/4	RC07GF680J
R22	Fixed Composition	3.3K	5	1/4	RC07GF332J
R23	Fixed Composition	1K	5	1/4	RC07GF102J
R24	Fixed Composition	1.5K	5	1/4	RC07GF152J
R25	Same as R10				
R26	Same as R21				
R27	Same as R15				
R28	Same as R10				
R29	Same as R1				
R30	Fixed Composition	1.5K	5	1/4	RC07GF152J
R31	Same as R4				
R32	Same as R20				
R33	Same as R4				
R34	Same as R1				
R35	Same as R4				
R36	Fixed Composition	5.6K	5	1/4	RC07GF562J
R37	Same as R4				
R38	Same as R3				
R39	Same as R4				
R40	Fixed Composition	120K	5	1/4	RC07GF124J
R41	Same as R4				
R42	Same as R1				

Marker - Series 400 - Dwg. G-02314 - Cont'd.

RESISTORS:

Ckt. Ref.	Description	Value Ohms	Tol. ±%	Rating Watts	Mfr. Part No. or Mil Type Desig.
R43	Same as R4				
R44	Same as R3				
R45	Same as R4				
R46	Same as R4				
R47	Fixed Composition	56K	5	1/4	RC07GF563J
R48	Same as R4				
R49	Fixed Composition	10	5	1/4	RC07GF100J
R50	Same as R49				
R51	Same as R1				
R52	Same as R4				
R53	Same as R24				
R54	Same as R36				

CAPACITORS:

Ckt. Ref.	Description	Value	Tol. ±%	Rating Volts	Mfr. Part No. or Mil Type Desig.
C1	Mica	220pf	2	300	CD7F221G300
C2	Ceramic disc	.1uf	20	25	Sprague Monolythic 5C7
C3	Mica	390pf	2	300	CD7F391G300
C4	Tantalum	2.2uf	10	20	Kemet K2R2J20KS
C5	Same as C1				
C6	Same as C4				
C7	Same as C2				
C8	Same as C2				
C9	Tantalum	10uf	10	20	Sprague 150D106X9020B2
C10	Mica	100pf	1	300	CD6F101G300
C11	Same as C2				
C12	Same as C2				
C13	Same as C4				
C14	Same as C2				
C15	Same as C2				
C16	Same as C10				
C17	Mica	470pf	2	100	CD7F471G100
C18	Same as C4				
C19	Electrolytic	25uf	-20+100	25	Sprague TE-1207
C20	Same as C2				
C21	Same as C4				
C22	Same as C9				
C23	Same as C2				
C24	Same as C2				
C25	Same as C4				
C26	Tantalum	3.3uf	10	35	Kemet K3R3J35KS
C27	Same as C4				
C28	Same as C2				
C29	Same as C19				

RESISTORS:

Ckt. Ref.	Description	Value Ohms	Tol. ±%	Rating Watts	Mfr. Part No. or Mil Type Desig.
R43	Same as R4				
R44	Same as R3				
R45	Same as R4				
R46	Same as R4				
R47	Fixed Composition	56K	5	1/4	RC07GF563J
R48	Same as R4				
R49	Fixed Composition	10	5	1/4	RC07GF100J
R50	Same as R49				
R51	Same as R1				
R52	Same as R4				
R53	Same as R24				
R54	Same as R36				

CAPACITORS:

Ckt. Ref.	Description	Value	Tol. ±%	Rating Volts	Mfr. Part No. or Mil Type Desig.
C1	Mica	220pf	2	300	CD7F221G300
C2	Ceramic disc	.1uf	20	25	Sprague Monolythic 5C7
C3	Mica	390pf	2	300	CD7F391G300
C4	Tantalum	2.2uf	10	20	Kemet K2R2J20KS
C5	Same as C1				
C6	Same as C4				
C7	Same as C2				
C8	Same as C2				
C9	Tantalum	10uf	10	20	Sprague 150D106X9020B2
C10	Mica	100pf	1	300	CD6F101G300
C11	Same as C2				
C12	Same as C2				
C13	Same as C4				
C14	Same as C2				
C15	Same as C2				
C16	Same as C10				
C17	Mica	470pf	2	100	CD7F471G100
C18	Same as C4				
C19	Electrolytic	25uf	-20+100	25	Sprague TE-1207
C20	Same as C2				
C21	Same as C4				
C22	Same as C9				
C23	Same as C2				
C24	Same as C2				
C25	Same as C4				
C26	Tantalum	3.3uf	10	35	Kemet K3R3J35KS
C27	Same as C4				
C28	Same as C2				
C29	Same as C19				

CAPACITORS:

Ckt. Ref.	Description	Value	Tol. ±%	Rating Volts	Mfr. Part No. or Mil Type Desig.
C30	Same as C2				
C31	Same as C19				
C32	Same as C4				
C33	Same as C2				
C34	Same as C2				
C35	Ceramic disc	.001uf	10	500	Centralab CE-102
C36	Same as C2				
C37	Same as C2				

FILTER ASSEMBLIES:

Ckt. Ref.	Description	Mfr. Part No. or Mil Type Desig.
A1	Filter Assembly	RCI D-02376
A2	Filter Assembly	RCI D-02377

TRANSFORMERS:

T1	RF Transformer (19.4 mc)	RCI D-02378
T2	Same as T1	

TRANSISTORS:

Q1	2N956, NPN-Silicon	RCI 32253
Q2	Same as Q1	
Q3	2N3323, PNP - Germanium	RCI 30251
Q4	2N2996, PNP - Germanium	RCI 30252
Q5	Same as Q3	
Q6	Same as Q4	
Q7	Same as Q4	
Q8	Same as Q3	
Q9	Same as Q1	
Q10	Same as Q1	
Q11	Same as Q1	
Q12	Same as Q1	
Q13	Same as Q3	

DIODES:

CR1	1N626	RCI 35507
CR2	Same as CR1	
CR3	Same as CR1	
CR4	1N914	RCI 35510

PARTS LIST - RA. 6367

R.F. & I.F. MODULE (R.H.) - Series 500 - Dwg. G-03009

NOTE: Assembly A03022 may be obtained as a complete module for spares purposes.

CONNECTORS:

Ckt. Ref.	Description	Mfr. Part No. or Mil Type Desig.
J501	Coaxial (I.F. Gain)	Micon 1003
J502	Same as J501	
J503	Same as J501	
J504	Module Connector, 25 Contacts	Cannon DBM-25P

CAPACITORS:

Ckt. Ref.	Description	Value	Tol. ±%	Rating Volts	Mfr. Part No. or Mil Type Desig.
C501	Electrolytic	500uf	-10 +75	50	Sprague 39D507G050GL
C502	Ceramic disc	0.1uf	20	25	Sprague 5C7
C503	Electrolytic	20uf		450	Sprague 39D206F450GL

P.C. ASSEMBLIES:

Ckt. Ref.	Description	Mfr. Part No. or Mil Type Desig.
A501	IF & DET	RCI A02168
A502	IF Sweep	RCI A02147
A503	Swept RF Stages	RCI A02313
A504	Marker	RCI A02316

PARTS LIST - RA.6367

I.F. AND DETECTOR - Series 600 - Dwg. G-02191

RESISTORS:

Ckt. Ref.	Description	Value Ohms	Tol. ±%	Rating Watts	Mfr. Part No. or Mil Type Desig.
R1	Not Used				
R2	Fixed Composition	100	5	1/4	RC07GF101J
R3	Same as R2				
R4	Fixed Composition	10	5	1/4	RC07GF100J
R5	Fixed Composition	220	5	1/4	RC07GF221J
R6	Fixed Composition	12K	5	1/4	RC07GF123J
R7	Fixed Composition	3.9K	5	1/4	RC07GF392J
R8	Fixed Composition	1K	5	1/4	RC07GF102J
R9	Same as R8				
R10	Fixed Composition	750	5	1/4	RC07GF751J
R11	Fixed Composition	270	5	1/4	RC07GF271J
R12	Same as R5				
R13	Fixed Composition	27K	5	1/4	RC07GF273J
R14	Fixed Composition	1.8K	5	1/4	RC07GF182J
R15	Fixed Composition	18K	5	1/4	RC07GF183J
R16	Fixed Composition	47	5	1/4	RC07GF470J
R17	Same as R8				
R18	Same as R4				
R19	Same as R5				
R20	Same as R6				
R21	Same as R7				
R22	Potentiometer	100	30	1/2	Beckman 62P-R100
R23	Same as R8				
R24	Fixed Composition	1.2K	5	1/4	RC07GF122J
R25	Fixed Composition	820	5	1/4	RC07GF821J
R26	Fixed Composition	180	5	1/4	RC07GF181J
R27	Same as R8				
R28	Same as R16				
R29	Same as R5				
R30	Fixed Composition	330	5	1/4	RC07GF331J
R31	Same as R6				
R32	Same as R7				
R33	Same as R8				
R34	Same as R5				
R35	Potentiometer	100K	30	1/2	Beckman 62P-R100K
R36	Fixed Composition	10K	5	1/4	RC07GF103J
R37	Fixed Composition	47K	5	1/4	RC07GF473J
R38	Same as R7				
R39	Potentiometer	20K	30	1/2	Beckman 62P-R20K
R40	Fixed Composition	1.5K	5	1/4	RC07GF152J
R41	Same as R2				
R42	Fixed Composition	68	5	1/4	RC07GF680J
R43	Fixed Composition	4.7K	5	1/4	RC07GF472J

I. F. and Detector - Series 600 - Dwg. G-02191 - Cont'd.

CAPACITORS:

Ckt. Ref.	Description	Value	Tol. ±%	Rating Volts	Mfr. Part No. or Mil Type Desig.
C1	Electrolytic	25uf	-20 +100	25	Sprague TE-1207
C2	Ceramic disc	.1uf	20	25	Sprague Monolythic 5C7
C3	Same as C2				
C4	Same as C2				
C5	Same as C2				
C6	Mica	3600pf	5	500	CM06F362JN3
C7	Same as C2				
C8	Same as C6				
C9	Same as C2				
C10	Same as C2				
C11	Mica	330pf	2	100	CD7F331G100
C12	Same as C2				
C13	Same as C2				
C14	Same as C2				
C15	Same as C2				
C16	Mica	270pf	2	300	CD7F271G300
C17	Same as C2				
C18	Same as C2				
C19	Same as C2				
C20	Mica	680	2	100	CD7F681G100
C21	Same as C2				
C22	Same as C2				
C23	Same as C11				
C24	Ceramic disc	.005uf	20	500	Centralab, DM502
C25	Same as C2				
C26	Same as C11				
C27	Ceramic disc	.005uf	+80 -20	50	Sprague TG-D50
C28	Same as C27				
C29	Same as C2				

INDUCTORS:

Ckt. Ref.	Description	Mfr. Part No. or Mil Type Desig.
L1	Variable, Coil Assy.	RCI D-02382
L2	Same as L1	
L3	Variable, Coil Assy.	RCI D-02379

FILTER ASSEMBLIES:

A1	Filter Assembly	RCI D-02380
A2	Filter Assembly	RCI D-02381

I.F. and Detector - Series 600 - Dwg. G-02191 - Cont'd.

TRANSFORMERS:

Ckt. Ref.	Description	Mfr. Part No. or Mil Type Desig.
T1	455 kc, IF	RCI B-3019-1
T2	455 kc, IF	RCI B-3019-2
T3	Same as T2	

DIODES:

CR1	1N695, Germanium	RCI 35515
CR2	Same as CR1	

TRANSISTORS:

Q1	2N1632, PNP Germanium	RCI 30752
Q2	Same as Q1	
Q3	2N1638, PNP Germanium	RCI 30755
Q4	Same as Q3	
Q5	2N3439, NPN Silicon	RCI 32001

RELAYS:

K1	dpdt, Non-latching, 26.5 volts	GE3SBC1008A2
K2	Same as K1	

CRYSTAL FILTER:

FL1	BPF Crystal Filter, 455 kc	RCI C-02073

I.F. and Detector - Series 600 - Dwg. G-02191 - Cont'd.

TRANSFORMERS:

Ckt. Ref.	Description	Mfr. Part No. or Mil Type Desig.
T1	455 kc, IF	RCI B-3019-1
T2	455 kc, IF	RCI B-3019-2
T3	Same as T2	

DIODES:

CR1	1N695, Germanium	RCI 35515
CR2	Same as CR1	

TRANSISTORS:

Q1	2N1632, PNP Germanium	RCI 30752
Q2	Same as Q1	
Q3	2N1638, PNP Germanium	RCI 30755
Q4	Same as Q3	
Q5	2N3439, NPN Silicon	RCI 32001

RELAYS:

K1	dpdt, Non-latching, 26.5 volts	GE3SBC1003A2
K2	Same as K1	

CRYSTAL FILTER:

FL1	BPF Crystal Filter, 455 kc	RCI C-02073

PARTS LIST - RA. 6367

IF SWEEP - Series 700 - Dwg. G-02180

RESISTORS:

Ckt. Ref.	Description	Value Ohms	Tol. ±%	Rating Watts	Mfr. Part No. or Mil Type Desig.
R1	Fixed Composition	47	5	1/4	RC07GF470J
R2	Fixed Composition	330	5	1/4	RC07GF331J
R3	Same as R2				
R4	Fixed Composition	47K	5	1/4	RC07GF473J
R5	Potentiometer	50K	30	1/2	Beckman 62P-R50K
R6	Same as R5				
R7	Fixed Composition	2.2K	5	1/4	RC07GF222J
R8	Fixed Composition	1K	5	1/4	RC07GF102J
R9	Fixed Composition	33K	5	1/4	RC07GF333J
R10	Potentiometer	10K	30	1/2	Beckman 62P-R10K
R11	Potentiometer	20K	30	1/2	Beckman 62P-R20K
R12	Not Used				
R13	Fixed Composition	270	5	1/4	RC07GF271J
R14	Fixed Composition	10K	5	1/4	RC07GF103J
R15	Fixed Composition	12K	5	1/4	RC07GF123J
R16	Fixed Composition	3.9K	5	1/4	RC07GF392J
R17	Same as R7				
R18	Fixed Composition	4.7K	5	1/4	RC07GF472J
R19	Same as R7				
R20	Fixed Composition	150K	5	1/4	RC07GF154J
R21	Fixed Composition	100K	5	1/4	RC07GF104J
R22	Same as R7				
R23	Same as R16				
R24	Fixed Composition	470	5	1/4	RC07GF471J

CAPACITORS:

Ckt. Ref.	Description	Value	Tol. ±%	Rating Volts	Mfr. Part No. or Mil Type Desig.
C1	Not Used				
C2	Ceramic disc	.1uf	20	25	Sprague Monolythic 5C7
C3	Electrolytic	4.7uf	10	35	Sprague 150D475X9035B2
C4	Electrolytic	22uf	10	15	Sprague 150D226X9015B2
C5	Ceramic disc	.005uf	+80 -20	50	Sprague TG-D50
C6	Same as C2				
C7	Same as C2				
C8	Not Used				
C9	Same as C2				
C10	Same as C5				
C11	Ceramic Disc	1800pf	10	1000	Centralab DD182

CAPACITORS:

Ckt. Ref.	Description	Value	Tol. ±%	Rating Volts	Mfr. Part No. or Mil Type Desig.
C12	Same as C2				
C13	Same as C5				

TRANSISTORS:

Ckt. Ref.	Description	Mfr. Part No. or Mil Type Desig.
Q1	2N492, Silicon, PNP - TI	RCI 31252
Q2	2N1308, Germanium, NPN	RCI 30753
Q3	2N1632, Germanium, PNP	RCI 30752
Q4	2N3242, Silicon, NPN	RCI 31251

MISCELLANEOUS:

VR1	Diode, 1N963B, Silicon	RCI 35519
CR1	Varicap, 150 pf	Philco V-4091
K1	Relay, dpdt, non-latching, 26.5 volts	G.E. 3SBC1008A2
A1	Coil Assembly	RCI D-02388
Y1	Crystal, 1145 kc, CR18A/U	RCI 37006

PARTS LIST - RA.6367

HORIZONTAL AND RF TIME BASES - Series 800 - Dwg. G-02216

RESISTORS:

Ckt. Ref.	Description	Value Ohms	Tol. ±%	Rating Watts	Mfr. Part No. or Mil Type Desig.
R1	Fixed Composition	18	5	1/4	RC07GF180J
R2	Fixed Composition	5.6K	5	1/4	RC07GF562J
R3	Fixed Composition	2.7K	5	1/4	RC07GF272J
R4	Fixed Composition	470	5	1/4	RC07GF471J
R5	Fixed Composition	330	5	1/4	RC07GF331J
R6	Fixed Composition	47K	5	1/4	RC07GF473J
R7	Potentiometer	50K	30	1/2	Beckman 62P-R50K
R8	Potentiometer	10K	30	1/2	Beckman 62P-R10K
R9	Fixed Composition	390K	5	1/4	RC07GF394J
R10	Fixed Composition	2.2K	5	1/4	RC07GF222J
R11	Fixed Composition	1K	5	1/4	RC07GF102J
R12	Same as R8				
R13	Potentiometer	2K	30	1/2	Beckman 62P-R2K
R14	Fixed Composition	3.9K	5	1/4	RC07GF392J
R15	Same as R13				
R16	Fixed Composition	560	5	1/4	RC07GF561J
R17	Same as R2				
R18	Same as R3				
R19	Same as R4				
R20	Same as R5				
R21	Fixed Composition	100	5	1/4	RC07GF101J
R22	Same as R6				
R23	Same as R7				
R24	Same as R7				
R25	Same as R10				
R26	Same as R11				
R27	Same as R11				
R28	Fixed Composition	8.2K	5	1/4	RC07GF822J
R29	Potentiometer	5K	30	1/2	Beckman 62P-R5K

CAPACITORS:

Ckt. Ref.	Description	Value	Tol. ±%	Rating Volts	Mfr. Part No. or Mil Type Desig.
C1	Ceramic disc	.1uf	20	25	Sprague Monolythic 5C7
C2	Same as C1				
C3	Same as C1				
C4	Not used				
C5	Electrolytic	4.7uf	10	35	Sprague 150D475X9035B2
C6	Electrolytic	22uf	10	15	Sprague 150D226X9015B2
C7	Same as C1				
C8	Not used				
C9	Same as C1				
C10	Same as C1				
C11	Same as C5				
C12	Same as C6				

TRANSISTORS:

Ckt. Ref.	Description	Mfr. Part No. or Mil Type Desig.
Q1	2N1632, PNP - Germanium	RCI 30752
Q2	2N492, PNP - Silicon, TI	RCI 31252
Q3	2N1308, NPN - Germanium	RCI 30753
Q4	2N3439, NPN - Silicon	RCI 32001
Q5	Same as Q1	
Q6	Same as Q2	
Q7	Same as Q3	

DIODE:

CR1	1N755A, 7.5 v ref, ±5%, 400 mw	Motorola

PARTS LIST - RA. 6367

POWER SUPPLY - Series 900 - Dwg. G-02231

RESISTORS:

Ckt. Ref.	Description	Value Ohms	Tol. ±%	Rating Watts	Mfr. Part No. or Mil Type Desig.
R1	Fixed Composition	2K	5	1/4	RC07GF202J
R2	Potentiometer	20K	30	1/2	Beckman 62P-R20K
R3	Fixed Composition	39K	5	1/4	RC07GF393J
R4	Fixed Composition	1.5M	5	1/4	RC07GF155J
R5	Fixed Composition	220K	5	1/4	RC07GF224J
R6	Fixed Composition	2.2M	5	1/4	RC07GF225J
R7	Fixed Composition	1M	5	1/4	RC07GF105J
R8	Same as R7				
R9	Same as R7				

TRANSISTOR:

Ckt. Ref.	Description	Mfr. Part No. or Mil Type Desig.
Q1	2N1189, Germanium PNP	RCI 30750

DIODES:

VR1	1N967B, Zener diode	RCI 33518
VR2	1N3049B, Zener diode	RCI 33516
VR3	1N4761A, Zener diode	RCI 33517
VR4	Same as VR3	

RA. 6367 POWER SUPPLY, 1300 Series, Dwg. G-02945

RESISTORS

Ckt. Ref.	Description	Value Ohms	Tol. ±%	Rating Watts	Mfr. Part No. or Mil Type Desig.
R1	Fixed Composition	100K	5	1/4	RC07GF104J
R2	" "	4.7	5	2W	RC42GF4R7J
R3	" "	18K	5	1W	RC32GF183J
R4	" "	68	5	1/4	RC07GF680J
R5	Not Assigned				
R6	Fixed Composition	2.7K	5	1/4	RC07GF272J
R7	Potentiometer	1K			Bourns 306 7P-1-102
R8	Fixed Composition	2.2K	5	1/4	RC07GF222J
R9	" "	330	5	1/4	RC07GF331J
R10	" "	1.2K	5	1/4	RC07GF122J

CAPACITORS

Ckt. Ref.	Description	Value	Tol. ±%	Rating Volts	Mfr. Part No. or Mil Type Desig.
C1	Ceramic, Disc	.02uf	+80 -20	500	Sprague 5HK-S20
C2	Same as C1				
C3	Electrolytic	500uf	+75 -10	50	Sprague 39D507G050GL4
C4	Same as C3				
C5	Ceramic	0.1uf	20	25	Sprague Monolythic 5C7
C6	Same as C5				
C7	Electrolytic	100uf		25	Sprague TE1211

TRANSFORMER

Ckt. Ref.	Description	Mfr. Part No. or Mil Type Desig.
T1	Power Transformer	RCI D-01650

DIODES

CR1A,B,C,D	Diode Bridge	Motorola MDA-920-2
CR2	1N916	
CR3	1N916	
CR4	1N626	
CR5A,B,C,D	Same as CR1	
VR1	1N753A	RCI 33507
VR2	1N2982B or 1N2982RB	RCI 33522

FUSES

F1301	0.5 amp 3AG Slo Blow	RCI 40011
F1302	1.5 amp 3AG Slo Blow	RCI 40015

SWITCH

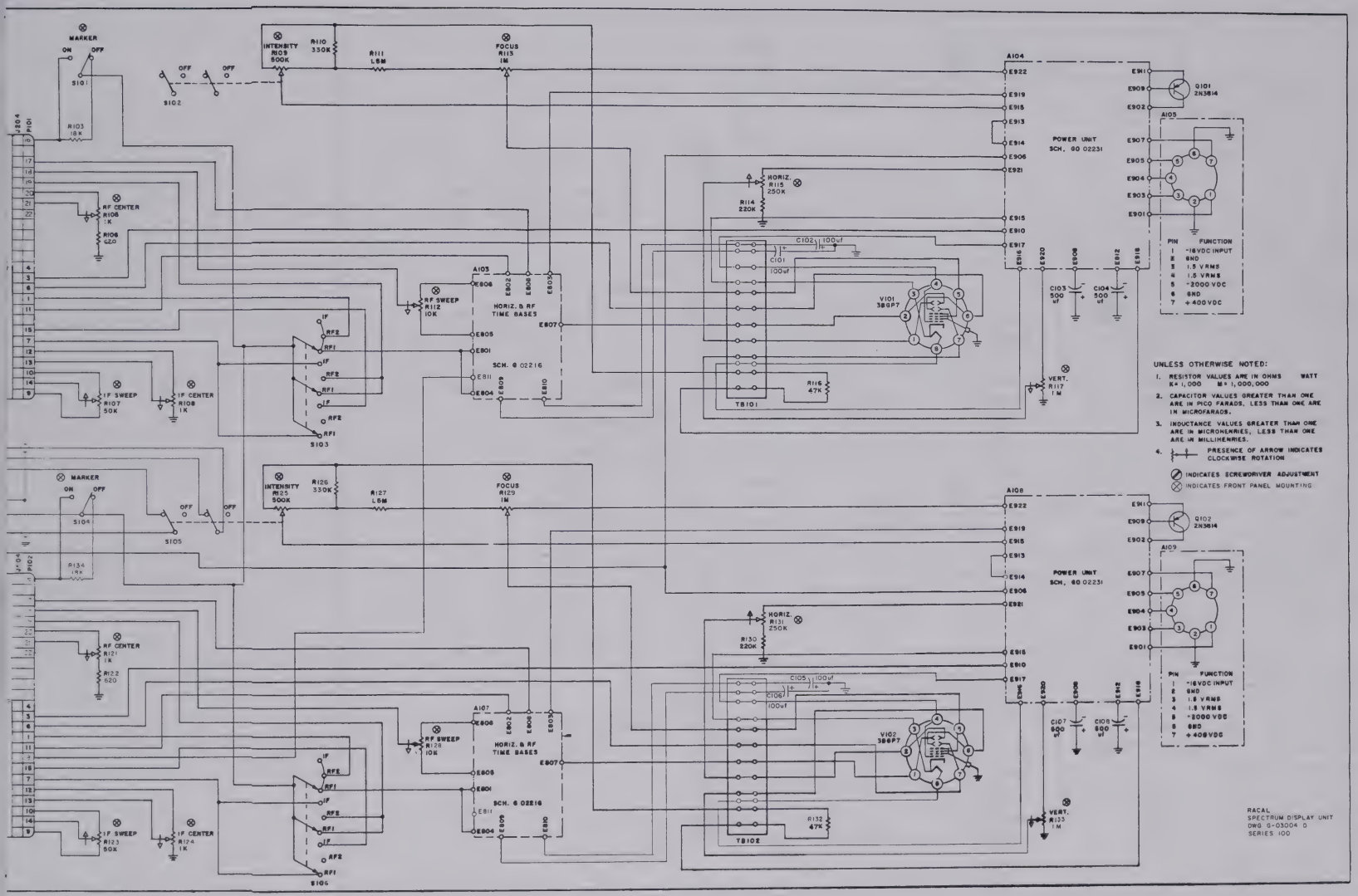
Ckt. Ref.	Description	Mfr. Part No. or Mil Type Desig.
S1	DPDT Slide Switch	Oak #278

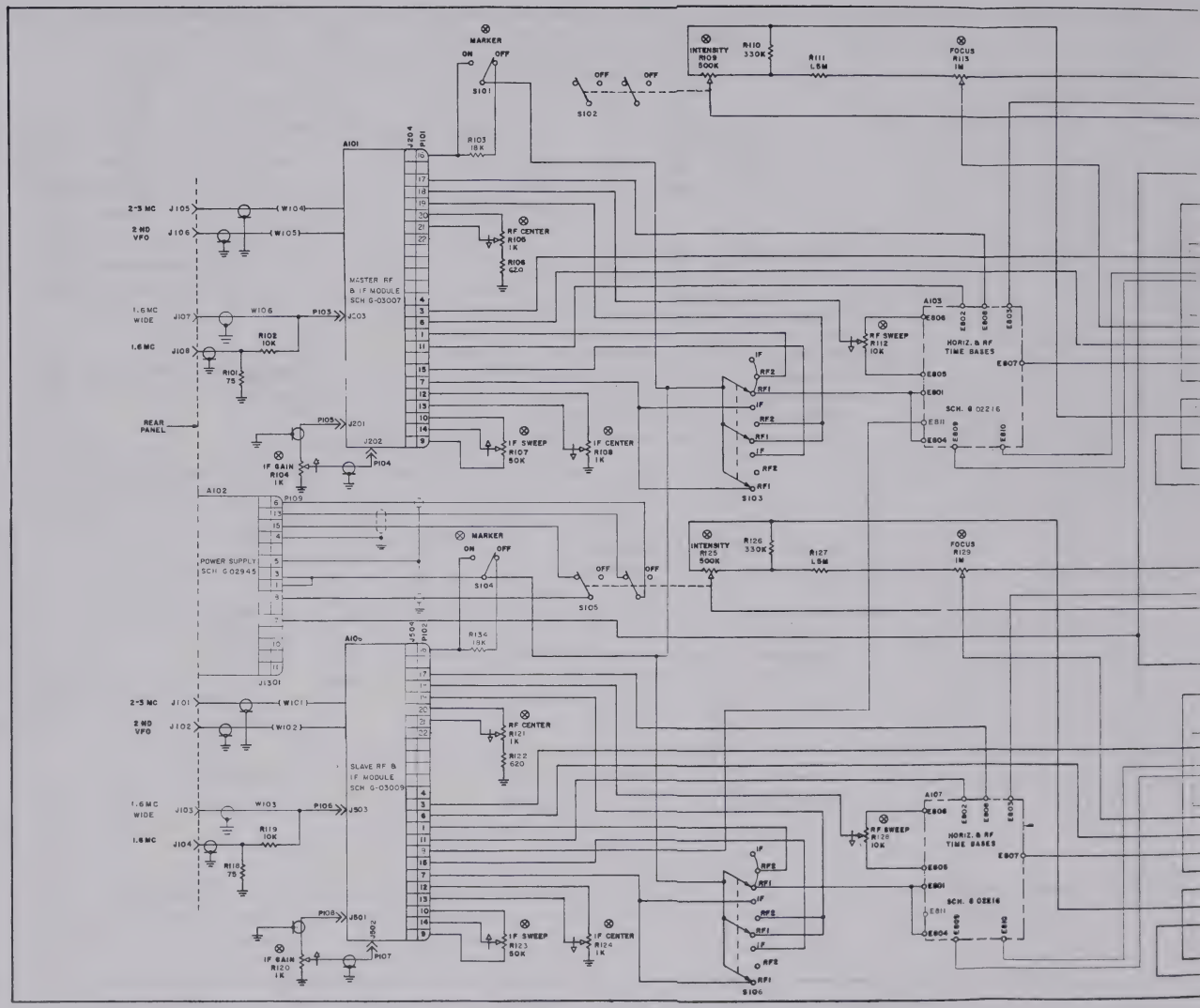
TRANSISTORS

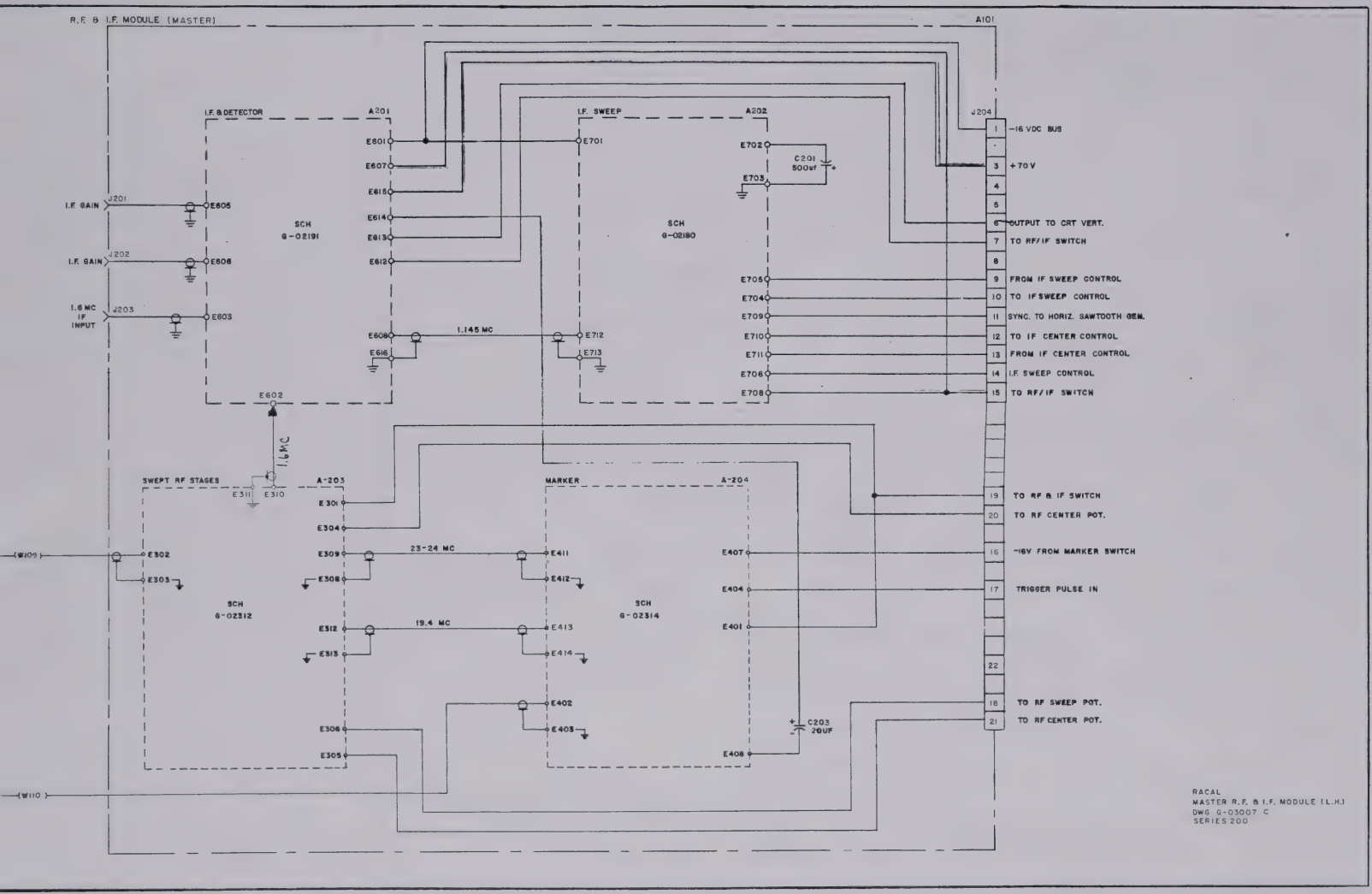
Q1	2N3242
Q2	2N1189
Q3	2N2412
Q4	2N3614

CONNECTORS

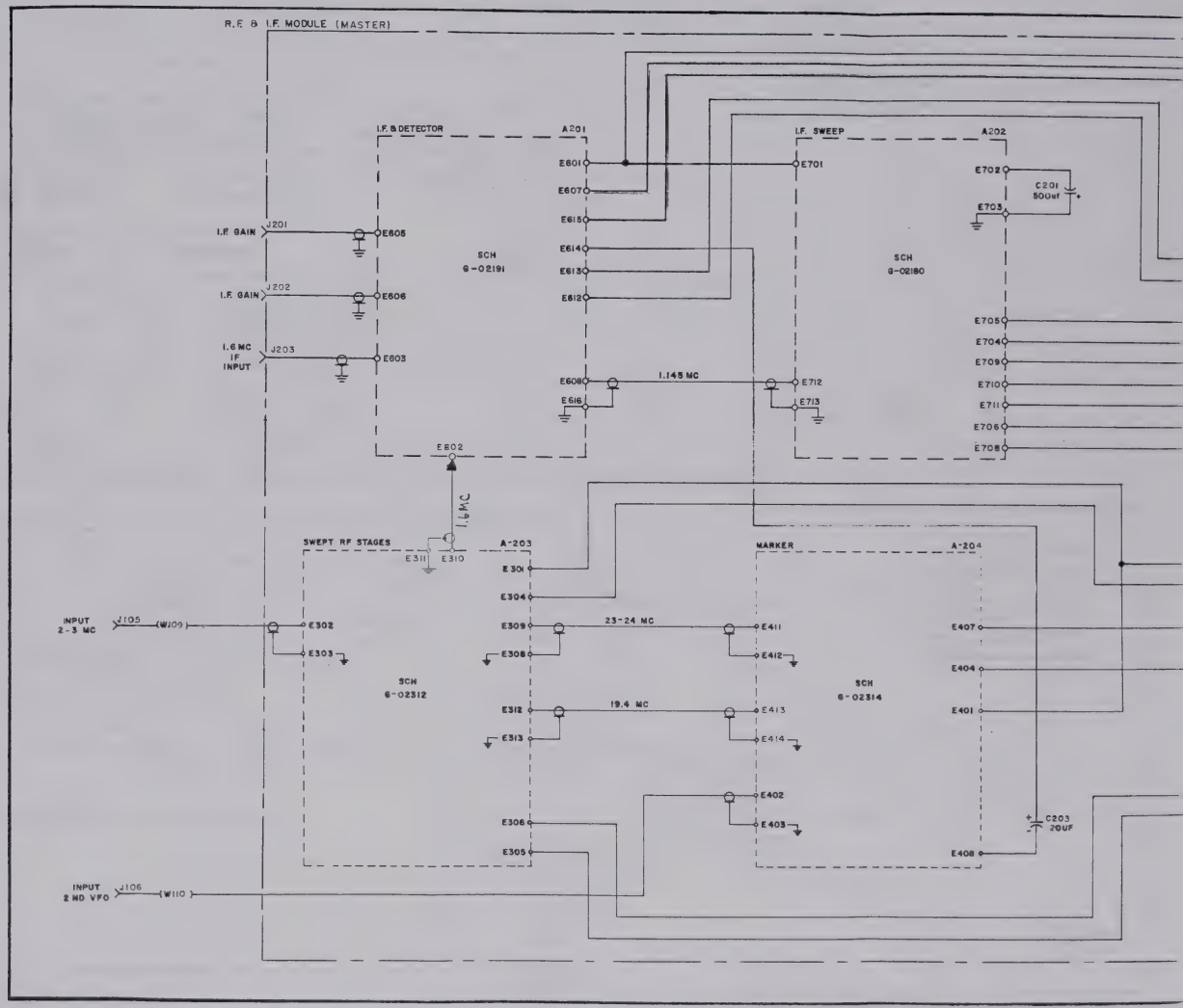
J1	15 Contacts, female	Cannon DAM-155

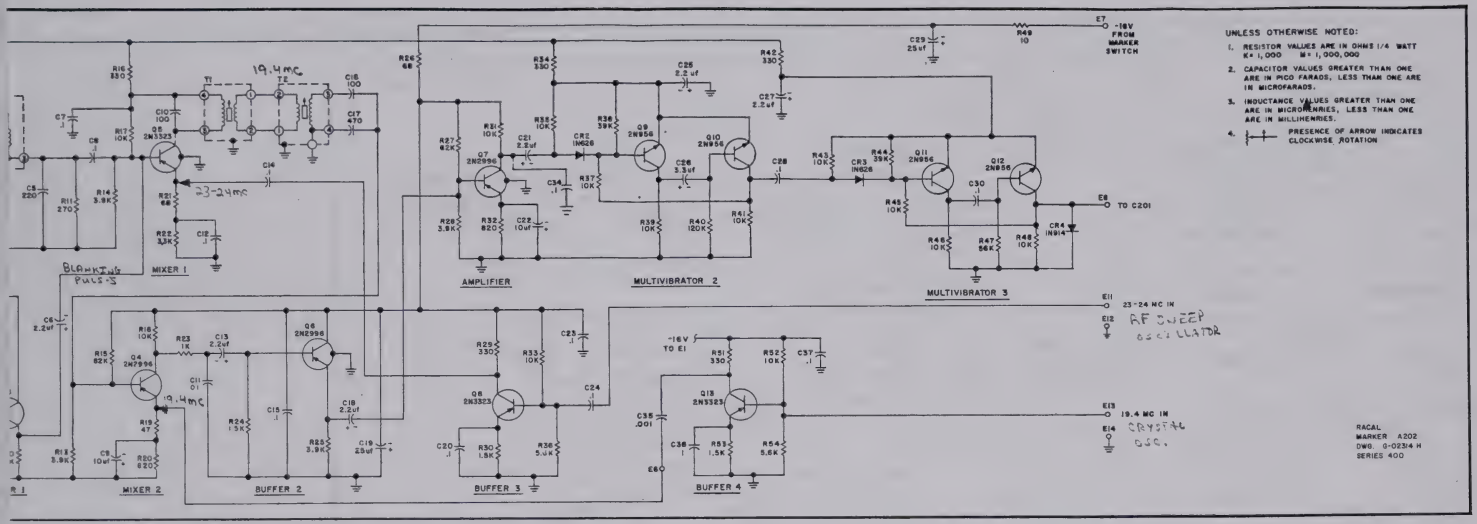

MARKER
ON
OFF
S101
S102
INTENSITY R109 500K
R110 330K
R111 1.5M
FOCUS R113 1M
R103 18K
RF CENTER R105 1K
R106 620
IF SWEEP R107 50K
IF CENTER R108 1K
S103
RF SWEEP R112 10K
A103
HORIZ. & RF TIME BASES
SCH. 6 02216
HORIZ. R115 250K
R114 220K
C102 100uf
C101 100uf
V101 3BGP7
R116 47K
TB101
VERT. R117 1M
A104
POWER UNIT SCH. 60 02231
Q101 2N3614
A105
C103 500 uf
C104 500 uf
PIN FUNCTION
1 -18VDC INPUT
2 GND
3 1.5 VRMS
4 1.5 VRMS
5 -2000 VDC
6 GND
7 +400 VDC
MARKER
ON
OFF
S104
S105
R134 18K
INTENSITY R125 500K
R126 330K
R127 1.5M
FOCUS R129 1M
RF CENTER R121 1K
R122 620
IF SWEEP R123 50K
IF CENTER R124 1K
S106
RF SWEEP R128 10K
A107
HORIZ. & RF TIME BASES
SCH. 6 02216
HORIZ. R131 250K
R130 220K
C105 100uf
C106 100uf
V102 3BGP7
R132 47K
TB102
VERT. R133 1M
A108
POWER UNIT SCH. 60 02231
Q102 2N3614
A109
C107 500 uf
C108 500 uf
PIN FUNCTION
1 -18VDC INPUT
2 GND
3 1.5 VRMS
4 1.5 VRMS
5 -2000 VDC
6 GND
7 +400 VDC
UNLESS OTHERWISE NOTED:
1. RESISTOR VALUES ARE IN OHMS WATT K= 1,000 M= 1,000,000
2. CAPACITOR VALUES GREATER THAN ONE ARE IN PICO FARADS, LESS THAN ONE ARE IN MICROFARADS.
3. INDUCTANCE VALUES GREATER THAN ONE ARE IN MICROHENRIES, LESS THAN ONE ARE IN MILLIHENRIES.
4. PRESENCE OF ARROW INDICATES CLOCKWISE ROTATION
INDICATES SCREWDRIVER ADJUSTMENT
INDICATES FRONT PANEL MOUNTING
RACAL SPECTRUM DISPLAY UNIT DWG G-03004 D SERIES 100

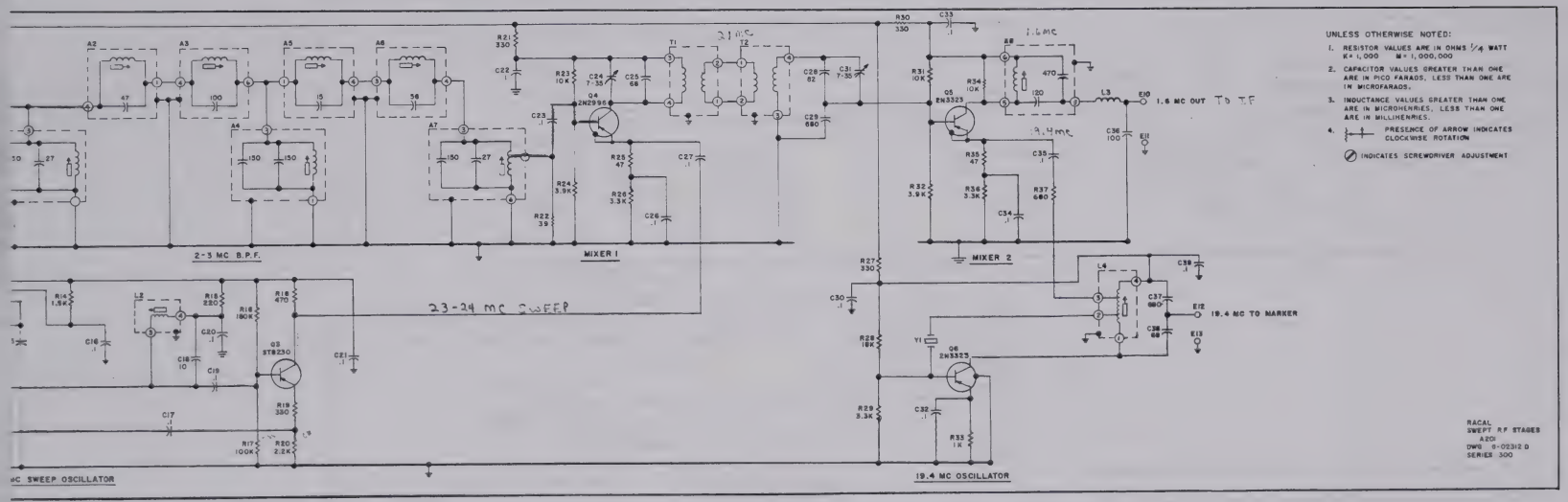

MARKER
ON
OFF
S101
S102
INTENSITY R105 500K
R110 330K
R111 1.5M
FOCUS R113 1M
A101
J204
P101
R103 18K
2-3 MC
J105
(W104)
2ND VFO
J106
(W105)
RF CENTER R105 1K
R106 620
MASTER RF & IF MODULE SCH G-03007
1.6 MC WIDE
J107
W106
P103
J203
R102 10K
1.6 MC
J108
R101 75
REAR PANEL
P105
J201
J202
P104
IF GAIN R104 1K
IF SWEEP R107 50K
IF CENTER R108 1K
A103
E806
E802
E808
E803
RF SWEEP R112 10K
HORIZ. & RF TIME BASES
E807
E805
E801
SCH. G 02216
E811
E804
E809
E810
IF
RF2
RF1
S103
A102
P109
POWER SUPPLY SCH G 02945
J1301
INTENSITY R125 500K
R126 330K
R127 1.5M
FOCUS R129 1M
S104
S105
A104
P102
J504
R136 18K
2-3 MC
J101
(W101)
2ND VFO
J102
(W102)
RF CENTER R121 1K
R122 620
SLAVE RF & IF MODULE SCH G-03009
1.6 MC WIDE
J103
W103
P106
J503
R119 10K
1.6 MC
J104
R118 75
P108
J501
J502
P107
IF GAIN R120 1K
IF SWEEP R123 50K
IF CENTER R124 1K
A107
E806
E802
E808
E803
RF SWEEP R128 10K
HORIZ. & RF TIME BASES
E807
E805
E801
SCH. G 02216
E811
E804
E809
E810
IF
RF2
RF1
S106

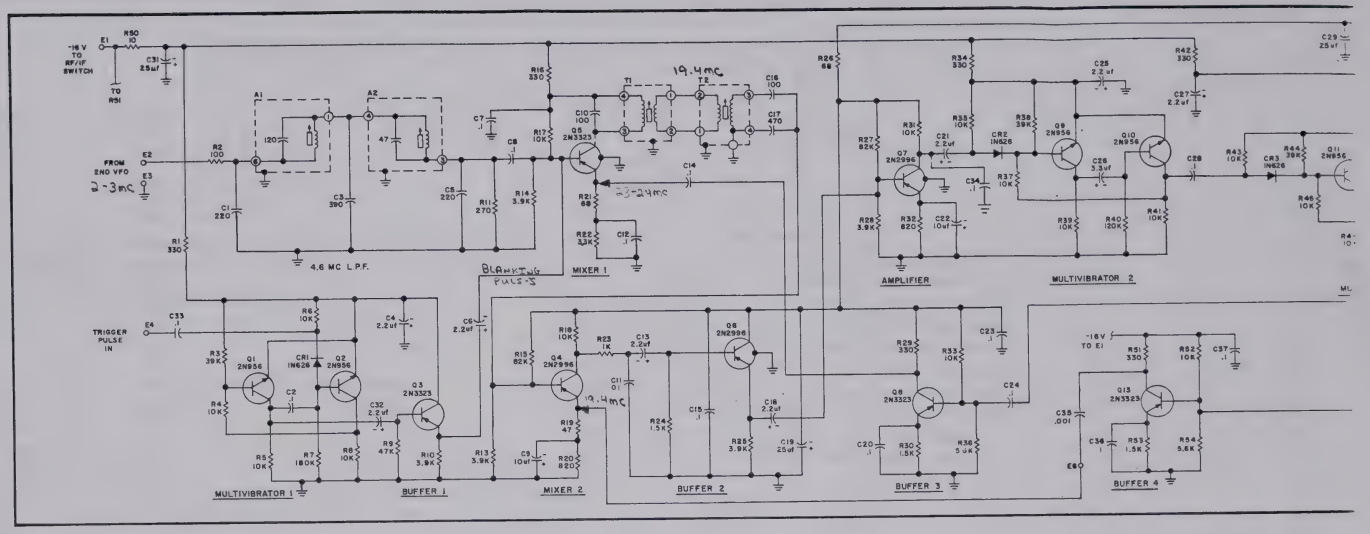


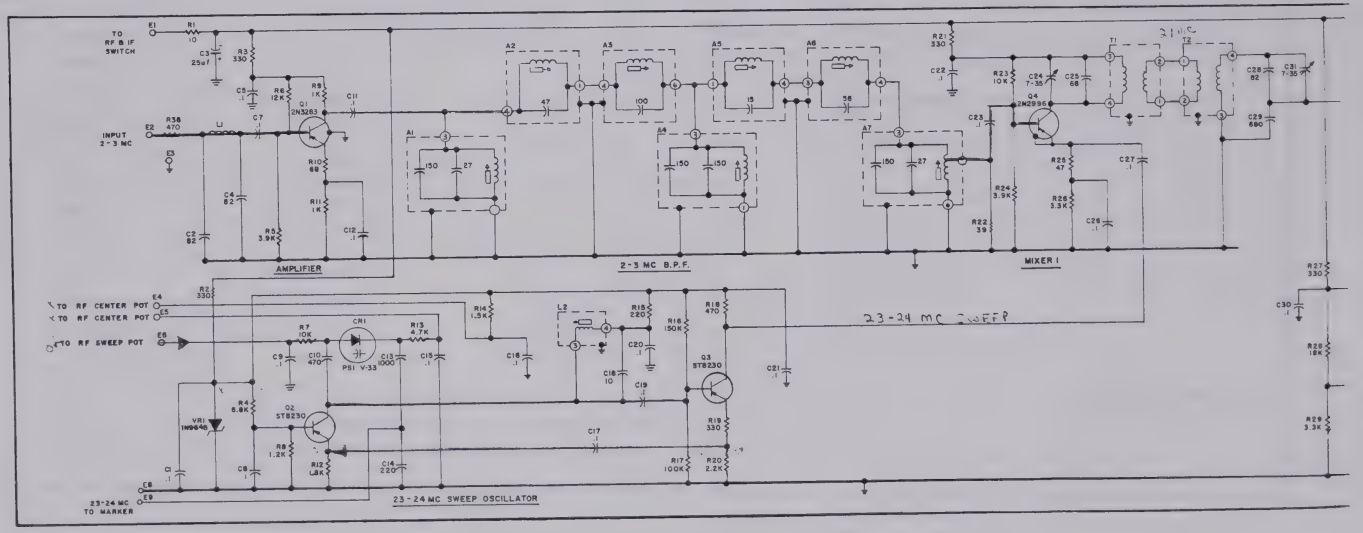
RACAL
MASTER R.F. & I.F. MODULE (L.H.)
DWG G-03007 C
SERIES 200

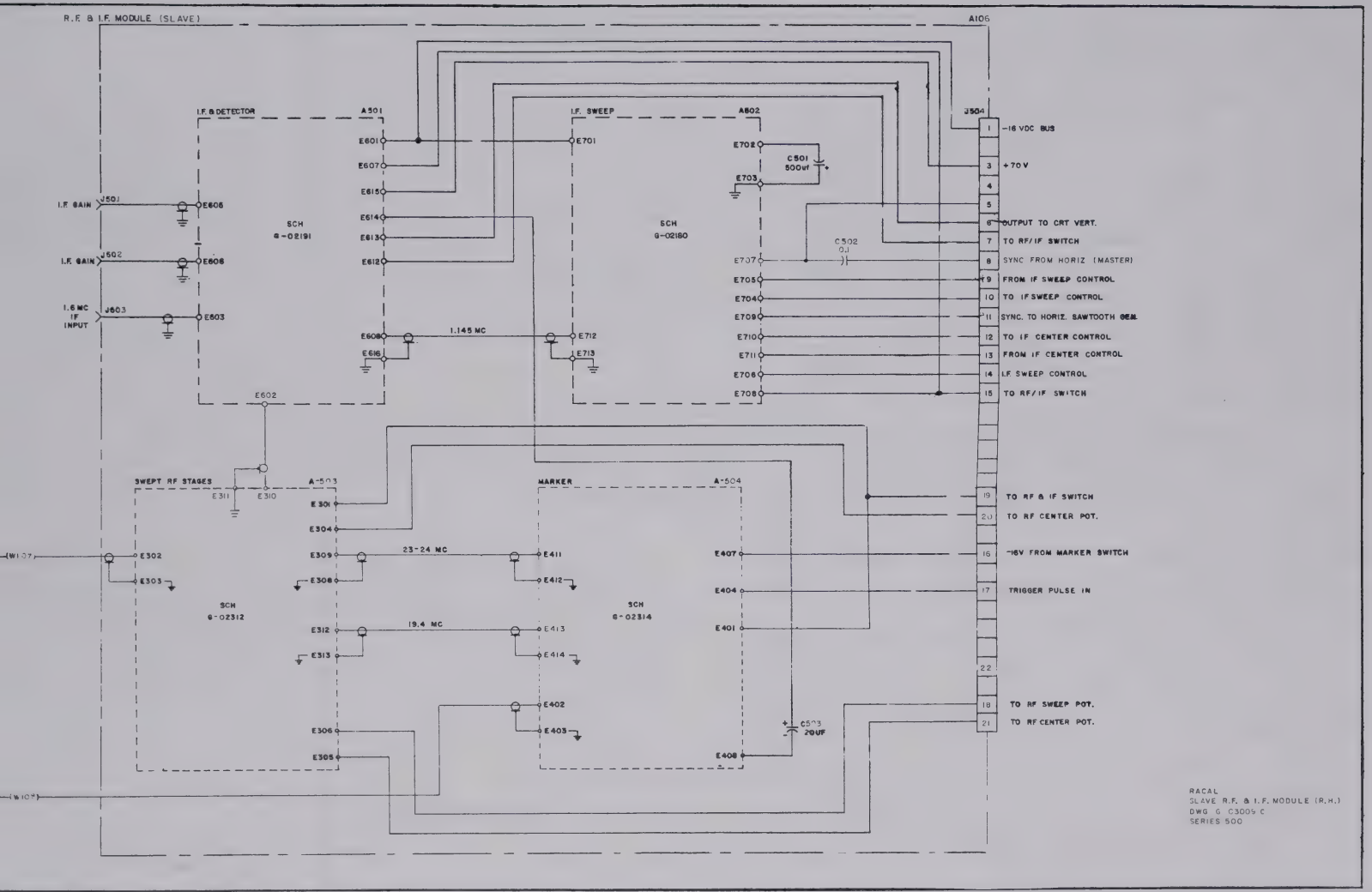

R.F. & I.F. MODULE (MASTER)
I.F. & DETECTOR
A201
I.F. SWEEP
A202
I.F. GAIN J201
I.F. GAIN J202
1.6 MC IF INPUT J203
E605
E606
E603
SCH 8-02191
SCH 8-02180
E601
E607
E615
E614
E613
E612
E701
E702
E703
C201 500uf
E705
E704
E709
E710
E711
E706
E708
E608
E616
1.145 MC
E712
E713
E802
1.6 MC
SWEPT RF STAGES
E311
E310
A-203
MARKER
A-204
INPUT 2-3 MC J105 (W109)
E302
E303
SCH 8-02312
E301
E304
E309
E308
23-24 MC
E411
E412
E312
E313
19.4 MC
E413
E414
E402
E403
E306
E305
SCH 8-02314
E407
E404
E401
E408
C203 20UF
INPUT 2ND VFO J106 (W110)


19.4mc
23-24mc
BLANKING PULSE
MIXER 1
AMPLIFIER
MULTIVIBRATOR 2
MULTIVIBRATOR 3
MIXER 2
BUFFER 2
BUFFER 3
BUFFER 4
-18V FROM MARKER SWITCH
TO C201
23-24 MC IN
RF SWEEP OSCILLATOR
19.4 MC IN
CRYSTAL OSC.
UNLESS OTHERWISE NOTED:
1. RESISTOR VALUES ARE IN OHMS 1/4 WATT K=1,000 M=1,000,000
2. CAPACITOR VALUES GREATER THAN ONE ARE IN PICO FARADS, LESS THAN ONE ARE IN MICROFARADS.
3. INDUCTANCE VALUES GREATER THAN ONE ARE IN MICROHENRIES, LESS THAN ONE ARE IN MILLIHENRIES.
4. PRESENCE OF ARROW INDICATES CLOCKWISE ROTATION
RACAL MARKER A202 DWG. 0-02314 H SERIES 400

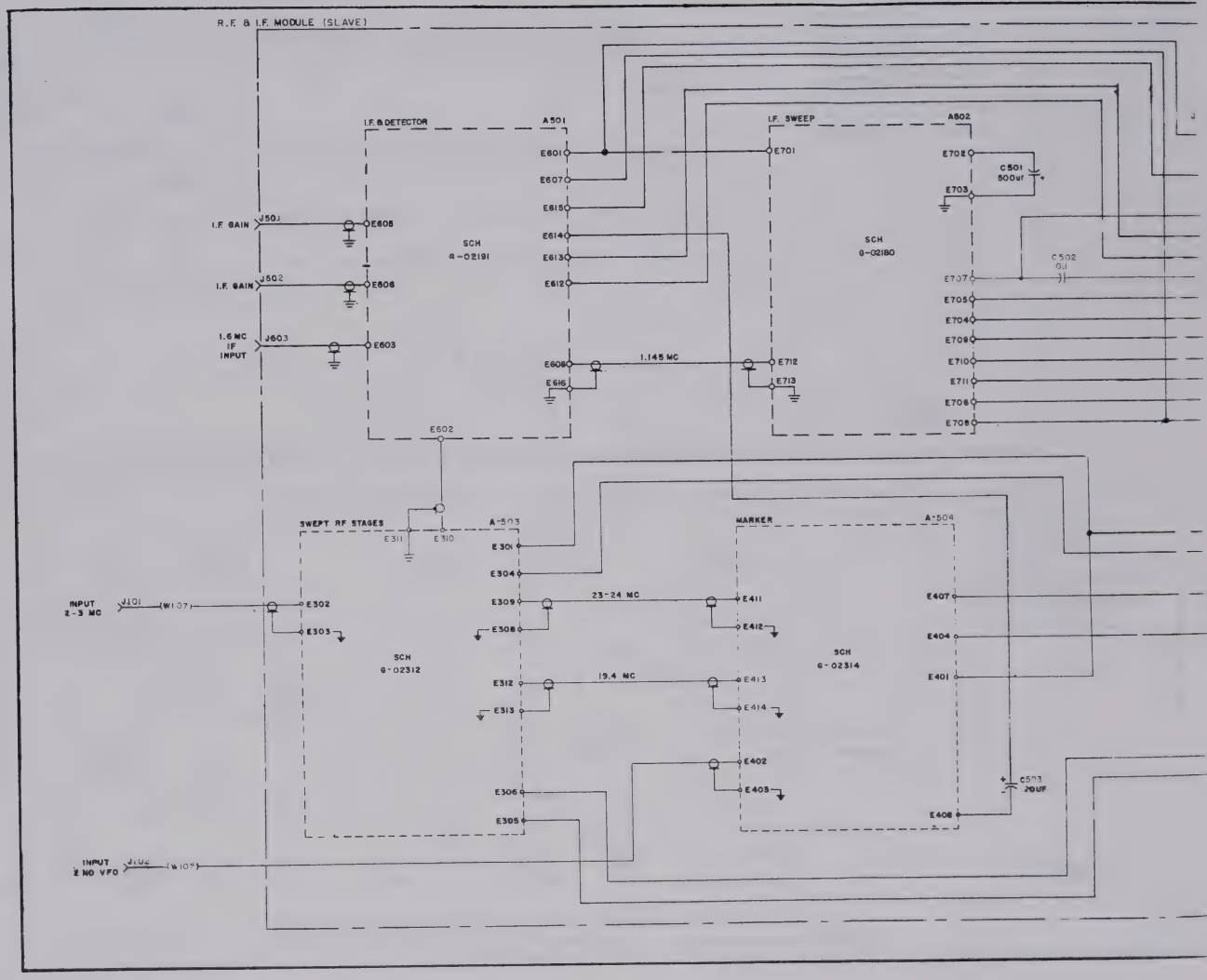

2-3 MC B.P.F.
MIXER 1
MIXER 2
23-24 mc SWEEP
MC SWEEP OSCILLATOR
19.4 MC OSCILLATOR
1.6 MC OUT TO TF
19.4 MC TO MARKER
UNLESS OTHERWISE NOTED:
1. RESISTOR VALUES ARE IN OHMS 1/4 WATT K=1,000 M=1,000,000
2. CAPACITOR VALUES GREATER THAN ONE ARE IN PICO FARADS, LESS THAN ONE ARE IN MICROFARADS.
3. INDUCTANCE VALUES GREATER THAN ONE ARE IN MICROHENRIES, LESS THAN ONE ARE IN MILLIHENRIES.
4. PRESENCE OF ARROW INDICATES CLOCKWISE ROTATION
INDICATES SCREWDRIVER ADJUSTMENT
RACAL SWEPT RF STAGES A201 DWG. 0-02312 D SERIES 300

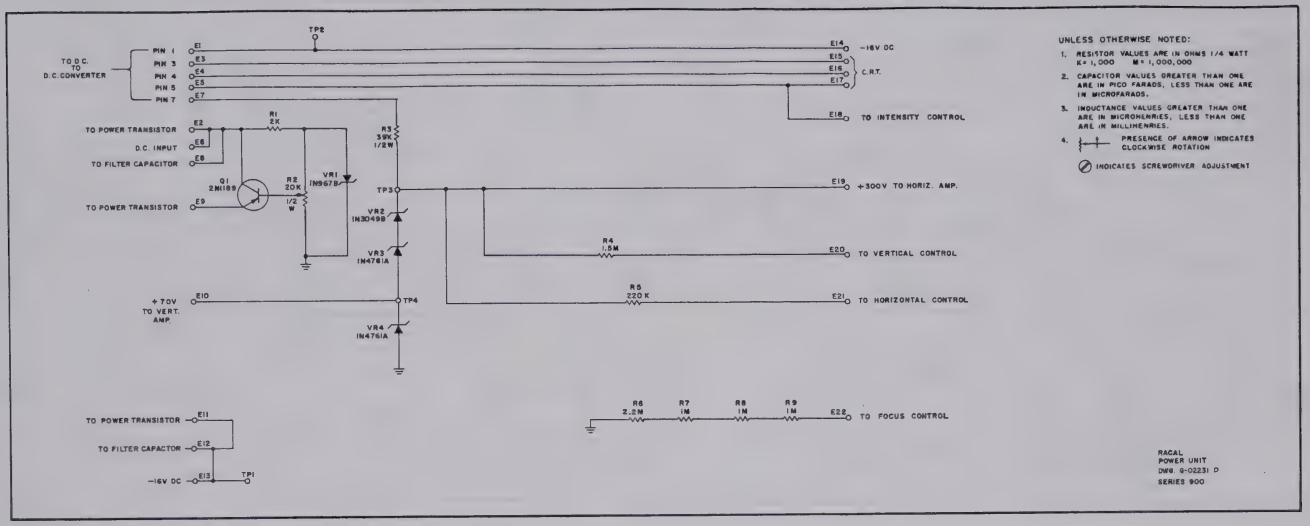

-16 V TO RF/IF SWITCH
TO RSI
FROM 2ND VFO
2-3 MC
4.6 MC L.P.F.
19.4 MC
MIXER 1
BLANKING PULSE
AMPLIFIER
MULTIVIBRATOR 2
TRIGGER PULSE IN
MULTIVIBRATOR 1
BUFFER 1
MIXER 2
BUFFER 2
BUFFER 3
BUFFER 4

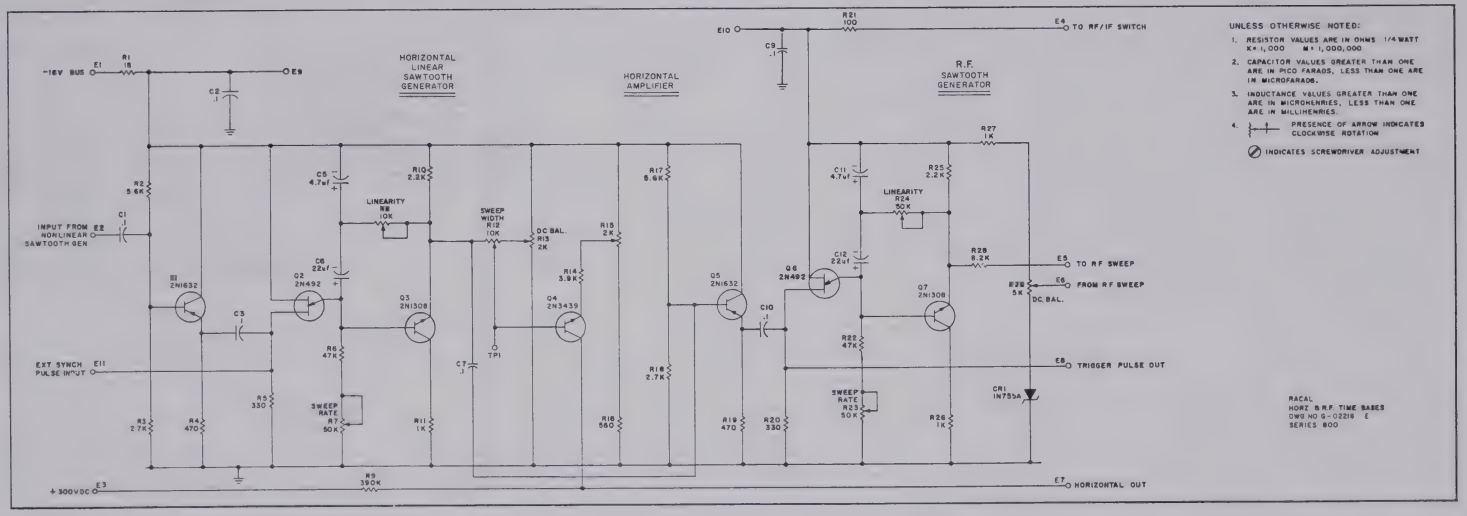

TO RF & IF SWITCH
INPUT 2-3 MC
AMPLIFIER
2-3 MC B.P.F.
MIXER 1
TO RF CENTER POT
TO RF CENTER POT
TO RF SWEEP POT
23-24 MC SWEEP
23-24 MC SWEEP OSCILLATOR
23-24 MC TO MARKER

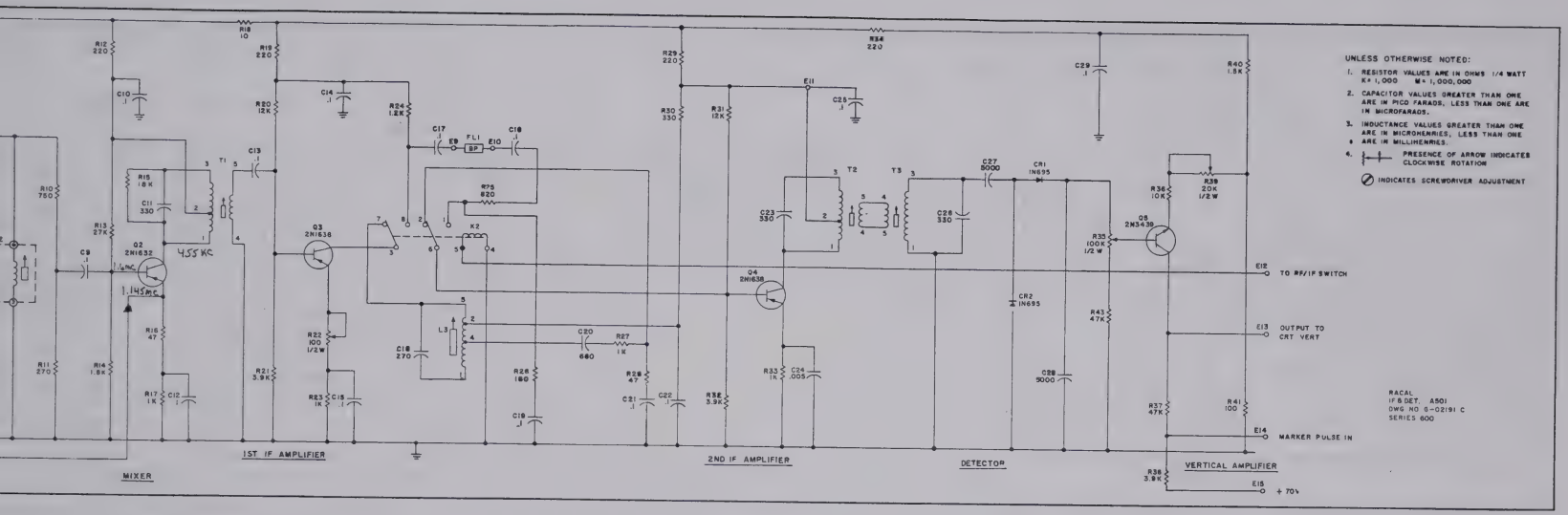


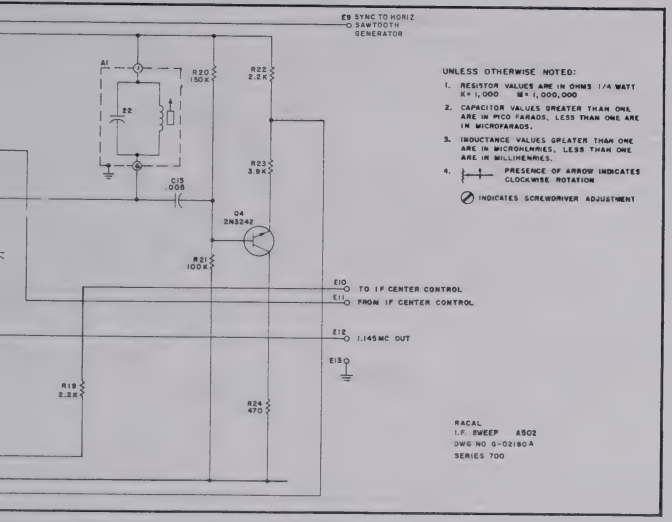
RACAL
SLAVE R.F. & I.F. MODULE (R.H.)
DWG G C3005 C
SERIES 500

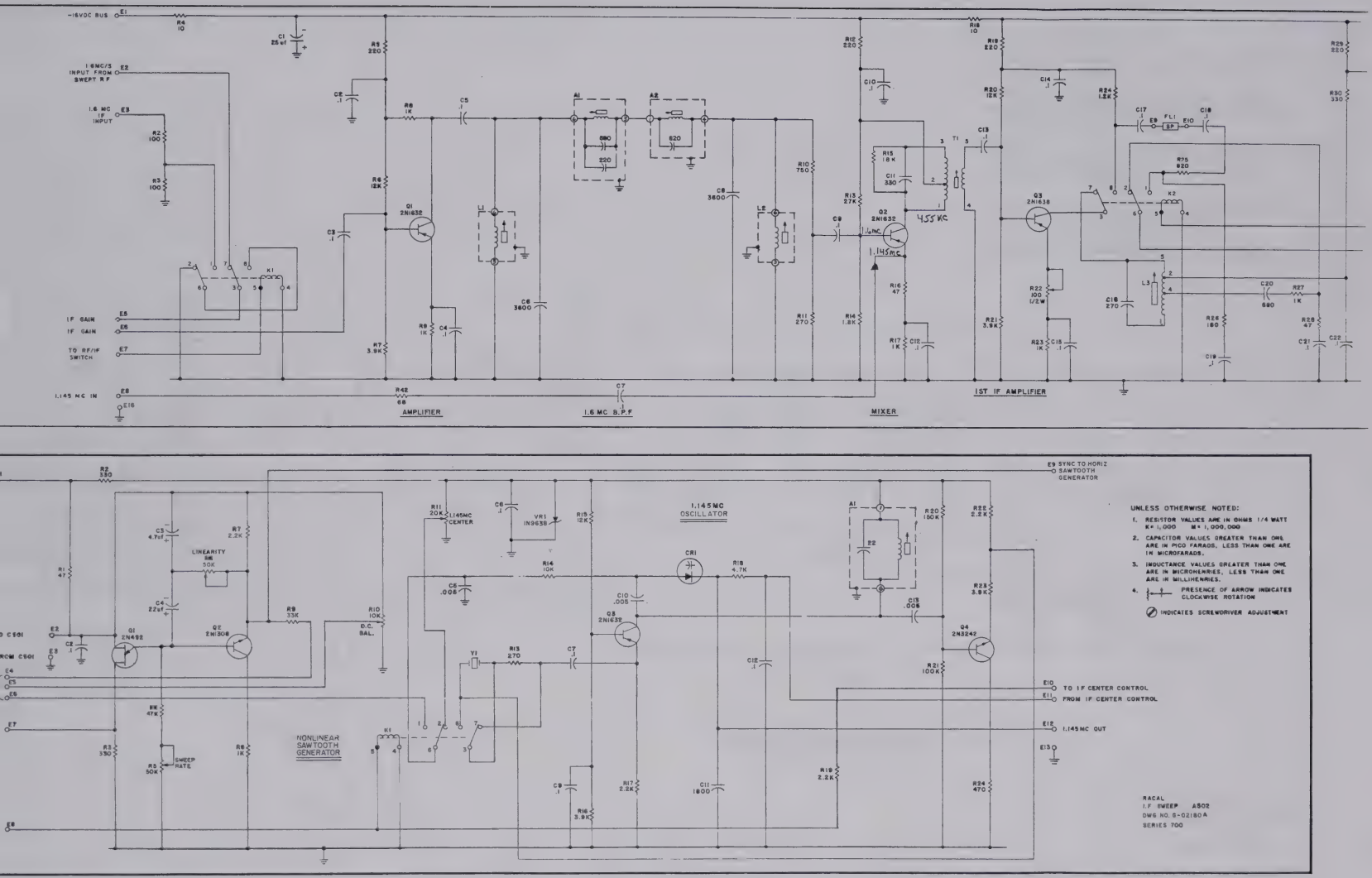

R.F. & I.F. MODULE (SLAVE)
I.F. & DETECTOR
A501
I.F. SWEEP
A502
I.F. GAIN J501
I.F. GAIN J502
1.6 MC IF INPUT J603
E601
E607
E615
E614
E613
E612
E608
E616
E603
E602
E701
E712
E713
E702
E703
E707
E705
E704
E709
E710
E711
E706
E708
C501 500uf
C502 .01
1.145 MC
SCH G-02191
SCH G-02180
SWEPT RF STAGES
A-503
MARKER
A-504
INPUT 2-3 MC J101 (W107)
INPUT 2 ND VFO J102 (W108)
E311
E310
E301
E304
E309
E308
E312
E313
E306
E305
E302
E303
E411
E412
E413
E414
E402
E403
E407
E404
E401
E408
23-24 MC
19.4 MC
C503 20UF
SCH G-02312
SCH G-02314

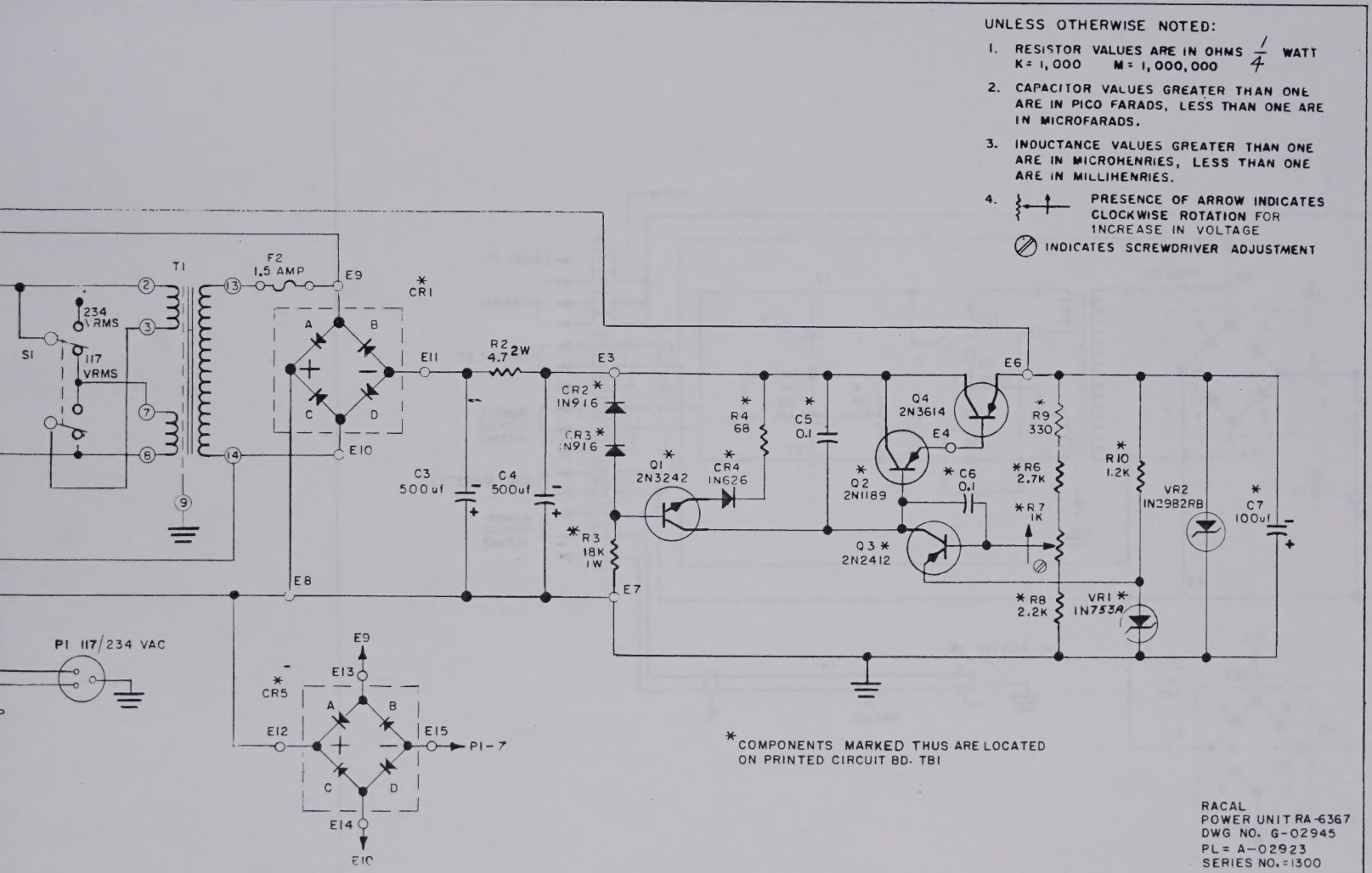

TP2
TO D.C. TO D.C. CONVERTER
PIN 1
PIN 3
PIN 4
PIN 5
PIN 7
E1
E3
E4
E5
E7
E14 -16V DC
E15
E16
E17 C.R.T.
E18 TO INTENSITY CONTROL
TO POWER TRANSISTOR
D.C. INPUT
TO FILTER CAPACITOR
E2
E6
E8
R1 2K
R3 39K 1/2W
Q1 2N1189
R2 20K 1/2 W
VR1 IN967B
VR2 IN3049B
VR3 IN4741A
TP3
E19 +300V TO HORIZ. AMP.
R4 1.5M
E20 TO VERTICAL CONTROL
R5 220K
E21 TO HORIZONTAL CONTROL
+70V TO VERT. AMP
E10
TP4
VR4 IN4761A
R6 2.2M
R7 1M
R8 1M
R9 1M
E22 TO FOCUS CONTROL
TO POWER TRANSISTOR
TO FILTER CAPACTOR
-16V DC
E11
E12
E13
TP1
UNLESS OTHERWISE NOTED:
1. RESISTOR VALUES ARE IN OHMS 1/4 WATT K=1,000 M=1,000,000
2. CAPACITOR VALUES GREATER THAN ONE ARE IN PICO FARADS, LESS THAN ONE ARE IN MICROFARADS.
3. INDUCTANCE VALUES GREATER THAN ONE ARE IN MICROHENRIES, LESS THAN ONE ARE IN MILLIHENRIES.
4. PRESENCE OF ARROW INDICATES CLOCKWISE ROTATION
INDICATES SCREWDRIVER ADJUSTMENT
RACAL
POWER UNIT
DWG 8-02231 D
SERIES 900

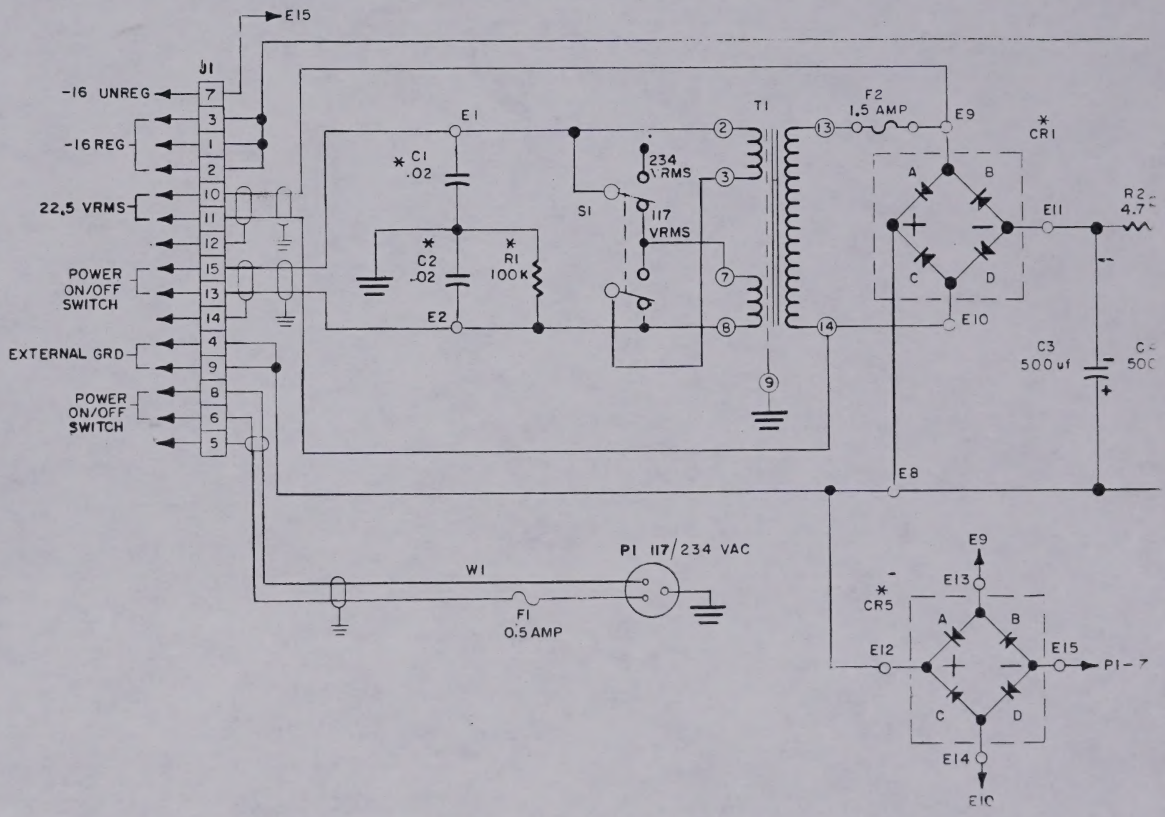
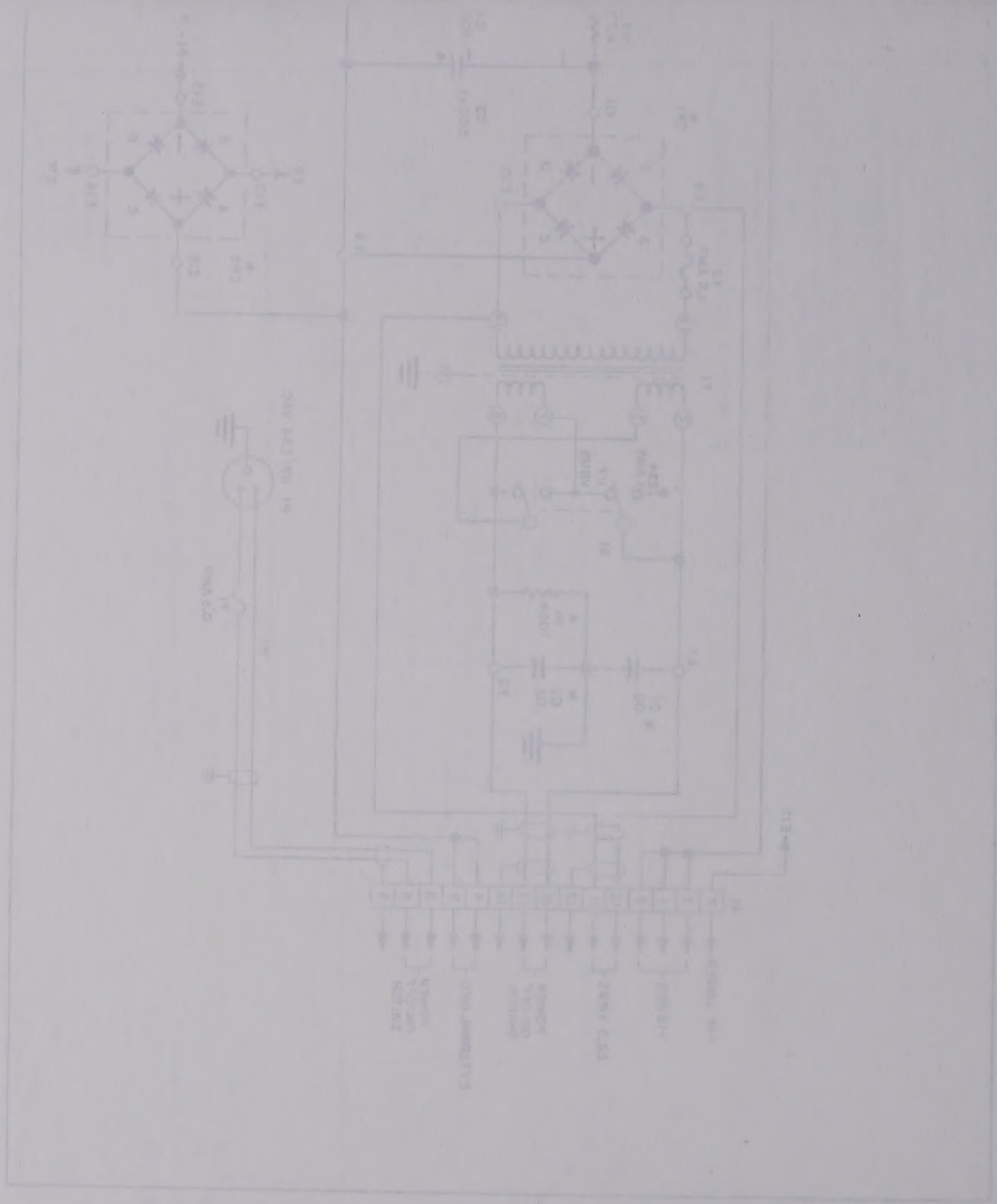

-16V BUS
E1
R1 1B
E9
C2 .1
HORIZONTAL LINEAR SAWTOOTH GENERATOR
HORIZONTAL AMPLIFIER
R.F. SAWTOOTH GENERATOR
E10
R21 100
E4 TO RF/IF SWITCH
C9 .1
R27 1K
R2 5.6K
C5 4.7uf
R10 2.2K
LINEARITY R8 10K
SWEEP WIDTH R12 10K
DC BAL. R13 2K
R15 2K
R17 5.6K
C11 4.7uf
R25 2.2K
LINEARITY R24 50K
INPUT FROM NONLINEAR SAWTOOTH GEN
E2
C1 .1
C6 22uf
Q1 2N1632
Q2 2N492
Q3 2N1308
Q4 2N3439
R14 3.9K
Q5 2N1632
Q6 2N492
C12 22uf
R28 8.2K
E5 TO RF SWEEP
E6 FROM RF SWEEP
E29 5K DC BAL.
Q7 2N1308
C3 .1
R6 47K
C7 .1
TP1
C10 .1
R22 47K
EXT SYNCH PULSE IN PUT
E11
E8 TRIGGER PULSE OUT
R5 330
SWEEP RATE R7 50K
R18 2.7K
SWEEP RATE R23 50K
CR1 IN755A
R3 2.7K
R4 470
R11 1K
R16 580
R19 470
R20 330
R26 1K
+300VDC
E3
R9 390K
E7 HORIZONTAL OUT
UNLESS OTHERWISE NOTED:
1. RESISTOR VALUES ARE IN OHMS 1/4 WATT K=1,000 M=1,000,000
2. CAPACITOR VALUES GREATER THAN ONE ARE IN PICO FARADS, LESS THAN ONE ARE IN MICROFARADS.
3. INDUCTANCE VALUES GREATER THAN ONE ARE IN MICROHENRIES, LESS THAN ONE ARE IN MILLIHENRIES.
4. PRESENCE OF ARROW INDICATES CLOCKWISE ROTATION
INDICATES SCREWDRIVER ADJUSTMENT
RACAL
HORZ & R.F. TIME BASES
DWG NO G-02216 E
SERIES 800


UNLESS OTHERWISE NOTED:
1. RESISTOR VALUES ARE IN OHMS 1/4 WATT K = 1,000 M = 1,000,000
2. CAPACITOR VALUES GREATER THAN ONE ARE IN PICO FARADS, LESS THAN ONE ARE IN MICROFARADS.
3. INDUCTANCE VALUES GREATER THAN ONE ARE IN MICROHENRIES, LESS THAN ONE ARE IN MILLIHENRIES.
4. PRESENCE OF ARROW INDICATES CLOCKWISE ROTATION
INDICATES SCREWDRIVER ADJUSTMENT
455 KC
1.145 MC
E12 TO RF/IF SWITCH
E13 OUTPUT TO CRT VERT
E14 MARKER PULSE IN
E15 + 70 V
MIXER
1ST IF AMPLIFIER
2ND IF AMPLIFIER
DETECTOR
VERTICAL AMPLIFIER
RACAL
IF & DET. A501
DWG NO S-02191 C
SERIES 600


E9 SYNC TO HORIZ SAWTOOTH GENERATOR
UNLESS OTHERWISE NOTED:
1. RESISTOR VALUES ARE IN OHMS 1/4 WATT K = 1,000 M = 1,000,000
2. CAPACITOR VALUES GREATER THAN ONE ARE IN PICO FARADS, LESS THAN ONE ARE IN MICROFARADS.
3. INDUCTANCE VALUES GREATER THAN ONE ARE IN MICROHENRIES, LESS THAN ONE ARE IN MILLIHENRIES.
4. PRESENCE OF ARROW INDICATES CLOCKWISE ROTATION
INDICATES SCREWDRIVER ADJUSTMENT
E10 TO IF CENTER CONTROL
E11 FROM IF CENTER CONTROL
E12 1.145 MC OUT
E13
RACAL
I.F. SWEEP A502
DWG NO S-02180 A
SERIES 700


-16VDC BUS
1.6MC/S INPUT FROM SWEPT RF
1.6 MC IF INPUT
IF GAIN
IF GAIN
TO RF/IF SWITCH
1.145 MC IN
AMPLIFIER
1.6 MC B.P.F
MIXER
1ST IF AMPLIFIER
455 KC
1.145MC
E9 SYNC TO HORIZ SAWTOOTH GENERATOR
1.145MC OSCILLATOR
NONLINEAR SAWTOOTH GENERATOR
LINEARITY
SWEEP RATE
D.C. BAL.
1.145MC CENTER
E10 TO IF CENTER CONTROL
E11 FROM IF CENTER CONTROL
E12 1.145MC OUT
UNLESS OTHERWISE NOTED:
1. RESISTOR VALUES ARE IN OHMS 1/4 WATT K= 1,000 M= 1,000,000
2. CAPACITOR VALUES GREATER THAN ONE ARE IN MICRO FARADS, LESS THAN ONE ARE IN MICROFARADS.
3. INDUCTANCE VALUES GREATER THAN ONE ARE IN MICROHENRIES, LESS THAN ONE ARE IN MILLIHENRIES.
4. PRESENCE OF ARROW INDICATES CLOCKWISE ROTATION
INDICATES SCREWDRIVER ADJUSTMENT
RACAL
I.F SWEEP A502
DWG NO. S-02180 A
SERIES 700


UNLESS OTHERWISE NOTED:
1. RESISTOR VALUES ARE IN OHMS 1/4 WATT
K = 1,000 M = 1,000,000
2. CAPACITOR VALUES GREATER THAN ONE ARE IN PICO FARADS, LESS THAN ONE ARE IN MICROFARADS.
3. INDUCTANCE VALUES GREATER THAN ONE ARE IN MICROHENRIES, LESS THAN ONE ARE IN MILLIHENRIES.
4. PRESENCE OF ARROW INDICATES CLOCKWISE ROTATION FOR INCREASE IN VOLTAGE
INDICATES SCREWDRIVER ADJUSTMENT
T1
F2 1.5 AMP
E9
CR1
S1
234 VRMS
117 VRMS
A
B
C
D
E11
R2 4.7 2W
E3
E6
CR2 IN916
CR3 IN916
R4 68
C5 0.1
Q4 2N3614
R9 330
E4
Q1 2N3242
CR4 IN626
Q2 2N1189
C6 0.1
R6 2.7K
R10 1.2K
VR2 IN2982RB
C7 100uf
E10
C3 500uf
C4 500uf
R7 1K
R3 18K 1W
Q3 2N2412
E8
E7
R8 2.2K
VR1 IN753A
P1 117/234 VAC
E13
CR5
E12
E15
P1-7
E14
E10
*COMPONENTS MARKED THUS ARE LOCATED ON PRINTED CIRCUIT BD. TBI
RACAL
POWER UNIT RA-6367
DWG NO. G-02945
PL = A-02923
SERIES NO. = 1300


E15
J1
-16 UNREG
-16 REG
22.5 VRMS
POWER ON/OFF SWITCH
EXTERNAL GRD
POWER ON/OFF SWITCH
7
3
1
2
10
11
12
15
13
14
4
9
8
6
5
E1
* C1 .02
* C2 .02
* R1 100K
E2
S1
234 VRMS
117 VRMS
T1
2
3
7
8
9
13
14
F2 1.5 AMP
E9
* CR1
A
B
C
D
E11
R2 4.7
E10
C3 500 uf
E8
P1 117/234 VAC
W1
F1 0.5 AMP
E9
E13
* CR5
E12
E15
P1-7
E14
E10